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SPECIES FILICUM.

SPECIES FILICUM;

BEING DESCRIPTIONS OF THE KNOWN FERNS, PARTICULARLY OF SUCH AS EXIST IN THE AUTHOR'S HERBARIUM, OR ARE WITH SUFFICIENT ACCURACY DESCRIBED IN WORKS TO WHICH HE HAS ACCESS;

ACCOMPANIED WITH NUMEROUS FIGURES:

55152

BY

SIR WILLIAM JACKSON HOOKER, K.H.,

D.C.L. Oxon., F.R.S., F.A.S., and F.L.S.;

CORRESPONDING MEMBER OF THE ACADEMY OF SCIENCES OF THE IMPERIAL INSTITUTE OF FRANCE, AND DIRECTOR OF THE ROYAL GARDENS OF KEW.

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VOL. II.

CONTAINING

ADIANTUM—CERATOPTERIS.

PLATES LXXI—CXL.

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PLATES LXXI.—CXL.

SPECIES FILICUM.

SUBORD. IV.—PTERIDEÆ.

Sori orbicular, oblong or linear, often continuous, marginal, situated at the apices of the veins or veinlets. *Involucre* formed of the replicate margin of, but mostly differing in texture from, the frond, taking the same shape as the sori, membranaceous or coriaceous, covering the capsules or sometimes bearing them on its underside (*Adiantum*), opening towards the axis of the frond or pinnule.—*Tufted or creeping* Ferns, *inhabiting various parts of the world, chiefly tropical.* Fronds *simple or variously divided and compound.* Veins *simple or forked or anastomosing.*

The present group corresponds, generally, with the *Pterideæ*, J. Sm., (excluding however all of his second section "*Metasoræ*," except *Lomaria*), and almost entirely with the *Adiantaceæ* of Presl. The name *Pterideæ* appears preferable, as expressing the most familiar Genus belonging to it. To me it seems the Suborder cannot be advantageously divided into sections, the Genera of which it is composed passing too gradually the one into the other to allow of it.

1. ADIANTUM, *L.*

Adiantum, *Linn.* (HOOK. GEN. FIL. TAB. LXVI. B.) Hewardia, *J. Sm.* (HOOK. GEN. FIL. TAB. LXXXIX.).

Sori marginal, globose, reniform, oblong or linear, distinct, or more or less confluent and continuous. *Involucre* the same shape as the sori, formed of the reflexed margin of the frond, on the underside, and bearing the capsules beneath, which capsules have their origin upon veinlets running into the involucre. *Capsules* stalked.—Ferns *of temperate or chiefly tropical countries, abounding in the New World, with simple or pinnate or compoundly divided fronds (never*

pinnatifid), variable in texture from membranaceous to coriaceous. Costa, *if present, excentric, generally indistinct or obsolete.* Veins *simple or usually forked, sometimes radiating, rarely* (*in* Hewardia, *J. Sm.*) *anastomosing.* Stipes *frequently black and glossy.* Pinnules *often cuneated and oblique.*

This Genus may be said to be a natural one, that is, generally easily recognized, even when destitute of fructification; the essential character, however, consisting in the position of the capsules or sori upon the underside of the involucre: by that mark alone are some species with small and distinct sori to be distinguished from *Cheilanthes*,* while others almost merge into *Pteris*. If, however, the Genus is, as a whole, well marked, great indeed is the difficulty of defining the limits of the species, or of knowing what are the species of authors without the aid of faithful figures, or authentically named specimens. In the several stages of growth, too, some species assume totally different appearances, and all kinds of shapes of pinnules are seen on one and the same frond. The presence or absence of fructification also changes considerably the outline of a pinnule. I regret, for my friend Mr. Heward's sake, that I cannot concur with those who consider the anastomosing of the veins as *alone* sufficient to constitute a genus of the *Hewardia*, J. Sm., and I shall be gratified if Mr. Smith himself would see the matter in the same light, and distinguish some better marked plant with the name of so excellent a man and so great a lover and student of Ferns. *Hewardia adiantoides*, as will be shown, is not the only *Adiantum* in which the veins anastomose; and there are various degrees of union, and in plants not otherwise allied to each other; so that such a character cannot be held to afford even tolerable sections: nor, practically, can such characters, derived from the fructification, as those of "*Sori inæquales v. lineares, continui, vel breviores contigui*" (Adianta Minervæ, *von Martius*), and "*Sori æquales, globosi, distincti. Indusium semilunatum*" (Adianta Veneris, *von Mart.*) of Presl. Such characters, distinct enough in some, seem to be combined in other individuals in one and the same species. In subsections they may be with some convenience employed.

§ I. *Frond simple.* (Sp. 1—3).

1. A. *reniforme*, L.; frond reniform with a broad shallow sinus, stipes slender. (Tab. LXXI. A.).—*Linn. Sp. Pl.* 1556. *Willd. Sp. Pl.* v. 427. *Sw. Syn. Fil.* 120.

Hab. Madeira, Teneriffe.

2. A. *asarifolium*, Willd.; frond orbicular reniform with a deep and narrow sinus the lobes generally overlapping. (Tab. LXXI. B.)—*Willd. Sp. Pl.* v. p. 427. A. reniforme, *Bory, Voy.* i. 358.

Hab. Mauritius, Bourbon.—I am aware that most botanists, except Willdenow, consider the present plant to be identical with the previous one.

---

* On this ground I have removed *Adiantum radiatum* to *Cheilanthes*, as properly suggested by Mr. J. Smith.

Copious specimens in my possession of both—the *reniforme* from Madeira and Teneriffe, the *asarifolium* from Mauritius and Bourbon—incline me to a different opinion: the western one is uniformly more slender and longer in proportion in the stipes, less scaly; the frond smaller, of a thinner texture, with a broad and shallow sinus, and constantly smaller and less densely approximated involucres. *A. asarifolium* is altogether and always a stouter and coarser plant. It is not a little remarkable that these two species appear peculiar to their respective localities, nothing like them having been detected in any part of the vast intermediate continent of Africa. Whether the following is allied or not, cannot be determined from the figure of Petiver.

3. A. *Philippense*, L.; "frond reniform, simple, alternate, petiolate, lobed, many-flowered." *Linn. Sp. Pl.* 1556. *Sw. Syn. Fil.* 120. *Willd. Sp. Pl.* v. 428.—*Petiv. Gazoph.* 8, *t.* 4, *f.* 4.

Hab. "Philippine Islands."—Petiver seems the only authority for this dubious plant, as well as for its locality.

§ II. *Fronds pinnate, rarely subbipinnate.* (Sp. 4—32).

* *Sori continuous and solitary, or more or less elongated and unequal.* (Sp. 4—11).

4. A. *macrophyllum*, Sw.; frond pinnate, pinnæ large chartaceous opaque somewhat glaucous beneath sessile or on very short petioles subfalcate, lower ones opposite, sterile ones broadly but obliquely ovate acuminate slightly lobed and serrated, fertile ones narrower obliquely and angulato-cuneate at the base, sori linear elongated more or less interrupted, stipes and rachis ebeneous glabrous.—*Sw. Syn. Fil. p.* 122. *Willd. Sp. Pl.* v. *p.* 429. *H. B. K. Nov. Gen. Am.* i. *p.* 16 *et* vii. *t.* 666. *Hook. et Grev. Ic. Fil. t.* 132. —*Br. Jam. t.* 38, *f.* 1.

Hab. West Indies and tropical America, common.—A very fine and well-marked species; yet the shape of the pinnæ is highly variable. In one specimen we find the lower pinnæ pinnate, but it seems a monstrosity.

5. A. *platyphyllum*, Sw.; "fronds pinnate, pinnæ petiolate ovate attenuate at the apex entire oblique at the base and gibbous at the upper base glaucous beneath, sori oblong contiguous occupying the whole margin." *Sw. Kongl. Vetersk. Ac. Handl.* 1817, *p.* 74, *t.* 3, *f.* 6. *Kze. Anal. Pterid. p.* 31, *t.* 20, *an Kze. in Linnæa*, ix. *p.* 79? *(not Kze. Poepp. Fil. exsic. in Herb. Hook.)*.

Hab. Near Villa Rica, Brazil, *Freyreis* (*Swartz*). Brazil, *Herb. Kaulf. propr., sterile* (*Kunze*). Pampayaco, Peru, *Poeppig* (*Kunze*).—Swartz's figure represents a very remarkable Brazilian plant, such as neither myself nor Mr. J. Smith have seen, with quite the habit, so far as can be judged from the figures, of our *A. Wilsoni*; the pinnæ few (four),

large, broad-ovate, long-petioled, sharply acuminated, quite entire (under the microscope said to be obsoletely serrulate), the rachis and stipes quite glabrous, but the sori are not contiouous,—they are broken up into several large, broad, and more or less elongated contiguous ones. Kunze, in his valuable 'Analecta Pteridographica,' gives a figure and description unquestionably of the same species (from Pampayaco, in Peru); one specimen represented at his f. B. (Tab. 20) is the very prototype of Swartz's figure. Unfortunately my specimen of Poepp. Plant. Exsicc., from Professor Kunze himself, is a very different fern, and a rather unusually large state of *A. Kaulfussii* (A. obliquum, *Sieb.*, *Hook. & Grev.*), with short petioles, narrower and smaller, gradually acuminated pinnæ, the sterile ones, or sterile portions, slightly lobed and conspicuously serrated, narrow sori and downy rachis. Presl, too, cites *A. platyphyllum* of Poeppig, Plant. exsicc., under *A. obliquum* (meaning no doubt the *A. Kaulfussii*, Kze. Herb. and Klotzsch, often taken for *A. obliquum*), and retains *A. platyphyllum* of Swartz as a distinct species. I can only do the same, referring to the latter the *figure* of Kunze above quoted.

6. A. *lucidum*, Sw.; frond oblong pinnate rarely below subbipinnate, pinnæ alternate on short petioles approximate ovato-lanceolate or lanceolate much acuminate rarely obtuse chartaceous the sterile serrated ones the broadest olivaceous green and glossy on both sides, the margins at the superior base truncate parallel with the rachis, lower margin dimidiato-cuneate, sori continuous uninterrupted along both margins to their apex, stipes and especially the rachis rough with ferruginous hairs. (Tab. LXXIX. C.)—*Sw. Syn. Fil. (excl. syn. of* Pteris lucida, *Cav. ?). Kze. in Linnæa*, ix. *p.* 78 *(who adduces here* A. asperum, *Desv.*, Pteris aspera, *Poir. & Presl).* A. Poeppigianum, *Presl, Tent. Pterid. (name).—β. major.—γ.* veins of the pinnæ often anastomosing. (Tab. LXXIX. C. f. 4).

Hab. Tropical America and West-Indian Islands. β. Cayenne, *LePrieur.* —γ. Caripi, near Pará, *R. Spruce, n.* 39.—This is a common plant, and I have copious specimens from various tropical regions of the New World; yet I can find it nowhere figured (unless Humboldt's *A. varium*, Nov. Gen. Am. t. 667, be the same, as I am sometimes disposed to believe it is) and nowhere satisfactorily described. It is clearly allied to *A. obliquum*, Willd., in form and general aspect, but is generally larger, and at once distinguished by the continuous line of fructification, of the length of the margin. I refer this to the little known or little understood *A. lucidum*, Swartz, that is, to his American specimen (for the *Pteris lucida*, Cav., from the Philippines, has probably nothing to do with it), because his character accords sufficiently well to justify me in doing so, and because Kunze, judging from his remarks in the 'Linnæa,' l. c., seems to have the same plant in view for *A. lucidum*. He compares it with *A. obliquum*, Hook. & Grev. (*A. Kaulfussii*, Kze.) Its affinity is indeed with that and with the true *A. obliquum*, W., but both those have interrupted sori. In size it is extremely variable, from eight or ten inches to two feet, as in some Guiana specimens.—My var. γ. is a remarkable one, for it exhibits the closest affinity with the present species in everything but the frequent anastomosing of the nerves on all the leaflets.

7. A. *Seemannii*, Hook.; caudex creeping knotted sending down copious woolly roots, fronds ovate pinnated, pinnæ few large 4—6 on long slender petioles obliquely and broadly deltoideo-ovate acuminate not lobed coriaceo-membranaceous, sterile ones closely and deeply inciso-serrated striated with the copious veins dark brown green and glossy above glaucous and opaque beneath, sori contiguous short oblong or linear-oblong and elongated more or less combined and continuous hard and coriaceous, stipes rachis and petioles black ebeneous and very glossy. (TAB. LXXXI. A.)

Hab. San Lorenzo, Veraguas, central America, Pacific side, *Seemann*, 1838, *n.* 1124.—All my specimens are simply pinnate, exhibiting no disposition to be compound, or I should have arranged the species with the *Pentadactylon* group; though even among them there is nothing approaching this in the almost coriaceous texture of the fronds, the deeply and spinulosely serrated margins of the sterile portions, the undivided (not lobed) margins and the confluent and often continuous lines of very unequal coriaceous involucres. In these particulars this fine species stands unique, and I have much pleasure in dedicating it to its discoverer, who accompanied Captain Kellett in his voyages of research in the Pacific, in the quality of Naturalist, and detected this plant at Veraguas in March, 1838. Many of the pinnæ are 4 inches long and 2½ broad. Were the sterile pinnules entire, I could almost consider it identical with *A. platyphyllum* of Swartz and Kunze; but I am quite puzzled with Kunze's specimens of "*platyphyllum*," which, as before observed, are *A. Kaulfussii*, a species with which this has little affinity.

8. A. *Phyllitidis*, J. Sm.; frond broadly ovate or subor-bicular pinnate, pinnæ 4—6 alternate petiolate large elliptical-lanceolate much acuminated opaque dark brown and coriaceous when dry, sterile ones unequally and obscurely serrate upper superior margin rounded at the base lower obliquely cuneate, veins forked free, sori continuous along both margins, petiole decurrent upon the rachis, stipes and rachis rough with ferruginous hairs. *J. Sm. Fil. Schomb. in Hook. Lond. Journ. Bot.* i. *p.* 197. (TAB. LXXII. B.)

Hab. British Guiana, *Sir Robert H. Schomburgk*, *n.* 300.—Mr. J. Smith, the only author who has noticed this plant (and the only specimens known are those from Sir R. H Schomburgk), justly observes, "This is rather a peculiar *Adiantum*: the circumstance of the petiole not being articulated with the rachis gives the species such a distinct and very marked character, that in the absence of sori it would scarcely be considered an *Adiantum*." In drying the pinnæ become brown; and the peculiar evenness and smoothness of the surface convey the idea that in a fresh state they are fleshy. The venation is forked (not reticulate), indistinctly visible. In size and general appearance, and in the continuous sorus, the affinity is clearly with *A. dolosum*, Kze., and our *A. Wilsoni*. It would seem from a further remark of Mr. J. Smith, l. c., that he considered Kunze had mistaken this for the *Lindsæa macrophylla*, Kaulf.; but Kunze has since shown that it was *A. dolosum*, Kze. and of this work, which he had con-

founded with (not taken for) *Lindsæa macrophylla*. The one (*A. dolosum*) has a reticulated venation, the other (*A. Phyllitidis*) has not.

9. A. *Wilsoni*, n. sp.; frond ovate pinnate, pinnæ 3—7 alternate petiolate large ovate-acuminate (sterile ones sharply and irregularly serrated) coriaceous dark green above paler and slightly glaucous beneath, both the margins at the base more or less rounded but the sides unequal not cuneate, costa distinct and ebeneous at the base, veins forked here and there anastomosing, sori continuous on both margins and nearly to the apex, stipes and rachis ebeneous glabrous. (TAB. LXXII. A.)

Hab. Shady, rather dry and gravelly places near Bath, Jamaica, *Mr. Wilson*.—I name this species in compliment to Mr. Wilson, the intelligent Curator of the Bath Botanic Garden, Jamaica, from whom Mr. Smith and myself have received dried specimens as well as living ones, which latter are growing and fructifying vigorously in the stoves of the Royal Gardens. Although very distinct as a species, it seems to hold an intermediate rank between *A. Phyllitidis* of J. Sm. and the *A. dolosum*, Kze. Its stipes and rachis are glabrous, the surface of the pinnæ is nearly as smooth and even as in the former, but occasionally the veins are slightly prominent. In the partial anastomosing of the veins the species approaches the latter: from both it is at once known by the broader and greener pinnæ, and the more rounded and more equal sides at the base. In cultivation the young fronds are sometimes seen quite simple, cordate, and finely but unequally serrated, as represented at our fig. 1. of Tab. LXXII. A. 1.

(*Veins everywhere anastomosing*, 10, 11).

10. A. *dolosum*, Kze.; frond ovate pinnate (very rarely subbipinnate below), pinnæ alternate very short-petioled subcoriaceo-chartaceous olive brown and slightly glossy when dry large lanceolate or elliptical-lanceolate very much acuminate almost caudate often falcate sterile portion serrulate, costa ebeneous at the base, the upper margin at the base rounded or truncated the lower one cuneate, veins everywhere anastomosing and prominent on the upper side in the dry state, terminal pinna the largest, sori continuous on both margins but leaving the much acuminated apex sterile, stipes and rachis ebeneous the latter especially slightly scabrous with rufous hairs. (TAB. LXXIX. B.)—*Kze. in Linnæa*, xxi. *p.* 219. Adiantum, *n. sp. Hook. in Obs. under* Lindsæa macrophylla, *supra*, *v.* i. *p.* 221. Lindsæa macrophylla, *Kze. Anal. Pterid. p.* 37 (the plant only of Moricand, *Blanch. n.* 2429; not the figure, TAB. 25, according to Kunze). "*Kappl. n.* 1766," *Hook. Gen. Fil. t.* 63, *and Ic. Plant. t.* 193 (*both incorrect as to the involucre, and the latter in the venation*).

Hab. Ilhios, Brazil, *Blanchet*. Surinam, *Kappler*. Coast of El Equa-

dor, *Seemann.*—Our observations on the *Lindsæa macrophylla* of Kunze, 'Analecta Pteridographica,' have elicited the fact that an *Adiantum* from Moricand (the plant we had the opportunity of inspecting) was confounded in that work with *Kaulfus'* original plant, which the learned author assures us is a true *Lindsæa*, as there described and figured. He has now in the 21st volume of the 'Linnæa' rightly described the plant of Moricand as a new species of *Adiantum* (*Hewardia*, J. Smith, on account of the copiously reticulated venation) under the name of *A. dolosum*, and has added another station for this apparently rare plant, namely, Mariepaston, in Surinam, where it was detected by Kappler. We, too, have had the good fortune to receive very fine specimens lately, collected by Mr. Seemann in El Equador, on the Pacific side of Tropical America. It is a most distinct and very fine species. Some of Mr. Seemann's specimens have pinnæ a span long (one pinna measures eight inches! and the broadest pinna is nearly two inches wide); so that it well deserves the title Kunze has given to it of "*Filix memorabilis.*"

11. A. *Hewardia*, Kze.; frond broad irregular pinnate or below bipinnate, pinnules alternate rather remote all petiolate more or less acuminate membranaceous olive brown when dry, the base unequal the upper margin rounded or truncate the lower cuneate, costa evident ebeneous below, veins everywhere anastomosing and forming irregular oblong hexagons, sori continuous on both margins generally to the very apex, stipes and rachis ebeneous glossy.—*Kze. Schkh. Fil. Suppl. p.* 104, *t.* 49. Hewardia adiantoides, *J. Sm. in Hook. Journ. of Bot.* iii. *p.* 432 *tab.* 16, 17; *and* iv. *p.* 161. *Hook. Gen. Fil. t.* 89.

Hab. French Guiana, *Martin, Le Prieur.*—I am indebted to my friend Mr. Heward for my specimens of this rare plant, and it seems an ungrateful return to be instrumental in abolishing a Genus which he so richly merits; but I confess I cannot see that it is agreeable to Nature to separate a Genus of Ferns on account of the mere anastomosing of the veins of the pinnæ, unaccompanied by any peculiarity of character or by a different habit. We have shown, too, that there are various grades of union of the otherwise dichotomous veins in this genus. We allow that the affinity of this is with *A. dolosum*, in which the reticulation exists, though less prominent: it is equally allied to *A. Wilsoni*, in which the anastomosing character is still less apparent, and perhaps yet more closely allied to *A. Phyllitidis*, in which the veins are *all* forked and free!

** *Sori suborbicular or oblong, not much elongated, nor continuous* (12—32).

12. A. *Kaulfussii*, Kze.; frond pinnate (very rarely below subbipinnate), pinnæ alternate short-petioled chartaceous ovato-lanceolate obtuse or acuminate obscurely costate near the petiole the base above truncately cuneate below dimidiato-cuneate glossy above glaucous and opaque beneath, the sterile ones lobed and serrated, sori all along the upper and lower margins generally to the apex oblong curved approximate rarely confluent and continuous, stipes and rachis ebe-

ueous more or less fusco-pubescent. *Kze. in Linnæa*, 1848, *p.* 221. A. obliquum, *Sieb. Fl. Martin*, *n.* 371. *Kaulf. En. Fil. p.* 200. *Hook. & Grev. Ic. Fil. t.* 190, *not Willd.* —*β.* pinnæ larger and broader. A. platyphyllum, *Poep. Fil. Exsicc. in Herb. nostr. (not Sw., nor Kze. in Anal. Pterid. p.* 31, *t.* 20).

Hab. Tropical America, West Indies, Mexico.—*β.* Amazon River, *Poeppig in Herb. nostr.*—This also appears a well-marked species: the under side of the frond is, I believe, invariably glaucous. Myself and others had considered it to be the *A. obliquum* of Willd., but as that author says nothing of the glaucous hue, even in his full description, I the more readily follow Kunze in his name of *A. Kaulfussii*. I am satisfied that the *A. platyphyllum* from the Amazon, of Poeppig's Fil. Exsicc., is a mere variety of this.

13. A. *obliquum*, Willd.; frond oblong pinnate or very rarely below subbipinnate, pinnæ alternate approximate short-petioled ovato-lanceolate obtuse or (especially the sterile sublobato-serrated ones) acuminated obscurely costate dark olivaceous green on both sides shining above, the margin at the upper base truncate and parallel with the rachis the lower margin dimidiato-cuneate, sori numerous oblong curved occupying the upper and lower margin to the very apex rarely subconfluent, stipes and especially the rachis rough with ferruginous down. (Tab. LXXIX. A.).—A. obliquum, *Willd. Sp. Pl.* v. *p.* 429 (excl. syn. A. lucidum, *Sw.* and Pteris lucida, *Cav.*) *Klotzsch, in Linnæa*, xviii. *p.* 550.—*β. major*; pinnæ longer and more acuminated. (Tab. LXXIX. A. f. 1).

Hab. S. America, Porto Rico and Caraccas, *Bredemeyer in Willd.* British Guiana, *Sir R. H. Schomburgk. Rich. Schomburgk, Klotzsch, in Herb. nostr. n.* 1175 and 1127.—*β.* Columbia, Pacific side, *Cuming*, *n.* 1202. Montagne de Mahurie, Cayenne, *Le Prieur* (*in Herb. nostr.*) Tanaii, near Pará, *R. Spruce, Coll. n.* 39.* Guadeloupe, *L'Hermonnier, Herb. nostr. ex Herb. Paris.*—My authority for this plant being the *A. obliquum* of Willd. is my valued friend Dr. Klotzsch, who has made the ferns the main objects of his study, and who is the able Curator of the Willdenovian herbarium. His plant, communicated to me, I believe to be truly distinct from what has been commonly taken for *A. obliquum*, although the chief character be the entire absence of any *glaucous* tint. What I here make var. *β.* has longer and more acuminated pinnæ, but does not appear to be otherwise distinct. It would seem to be a rare species, and I have given all the stations I know for it. It was not found in Mr. J. Smith's rich fern herbarium.

14. A. *Cubense*, Hook.; caudex stout creeping scaly, fronds (a span long) lanceolate not rooting, pinnæ alternate on short petioles chartaceous brown-green semiovate the lower base above truncated and parallel with the rachis, su-

perior margin lobed, lobes bidentate, sori reniform between the incurved teeth of each lobe, stipes and rachis ebeneous glabrous. (TAB. LXXIII. A.)

Hab. Cuba, *Linden* (1843-4), n. 1867.—I do not find this anywhere described, but it seems a perfectly formed plant, with the slender rachis and petioles such as are seen in *A. lunulatum*, but with very differently shaped pinnæ, differently colored, having strongly toothed lobes even in fructification, and a creeping scaly caudex. Can it be a simply pinnated form, with narrower pinnæ, of *A. cristatum* ?

15. A. *deltoideum*, Sw.; cæspitose (a span high) fronds linear-oblong pinnated (rarely bipinnate), pinnæ membranaceo-chartaceous rather distant petiolate obliquely cordato-rotundate obscurely lobato-crenate, fertile ones deltoid or obliquely deltoid angles obtuse, sori linear interrupted or sometimes continuous nearly to the apex, stipes short ebeneous very paleaceo-hirsute at the base and a line of delicate chaffy hairs is continued up the front of the stipes and of the ebeneous rachis.—*Sw. Syn. Fil. p.* 122. *Fl. Ind. Occ.* iii. *p.* 1705. *Kze. Anal. Pterid. p.* 32, *t.* 17, *f.* 2.

Hab. Jamaica, on calcareous rocks, *Swartz*, *Purdie*, *Mc Nab*. St. Domingo, *Bertero*. Crevices of rocks near the sea-shore, Cuba, *B. D. Greene*, *Esq.*—A most distinct and well marked species: the fructification is confined to the inferior and superior margins, not reaching quite to the apex; and the truncated base, whence the veins diverge, has no sorus. Our specimens are nearly all simply pinnate, which appears to be the normal character. Kunze's plant, from St. Domingo, represents a lower pinna again divided, as described by Swartz. Kunze compares the plant, and not inaptly, to *Pteris calomelanos* in habit. Some of our specimens are thrice the size of the largest figured by Kunze.

16. A. *Shepherdi*, Hook.; frond linear-oblong (a foot and more high) very much elongated slightly attenuated upwards and obtuse erect stiff, pinnæ quite sessile densely imbricated chartaceo-coriaceous reniform obliquely inserted lower ones distichous upper ones all secund radiato-venose the veins prominent obscurely lobed when sterile, the fertile ones crenato-lobate with narrow incisions the margin thickened all round, involucres cordato-reniform inserted at the bottom of the narrow sinus their margins membranaceous, stipes ——? rachis ebeneous very glossy glabrous stout. (TAB. LXXIII. B.)

Hab. Mexico, *W. Bates*, *Esq.*, 1834.—Of this singular plant I have but a solitary, and, I regret to say, imperfect, specimen, presented to me by my good friend Mr. Henry Shepherd, Curator of the Liverpool Botanic Garden, whose knowledge and love of Ferns justly entitle him to the compliment of having it bear his name. The root and stipes are wanting. All that I possess is figured at Tab. LXXIII. B. The peculiar direction of the pinnæ may not be, and probably is not constant, but their form and

texture, without the trace of a petiole, and their thickened margins, are quite peculiar. The plant is of a firm and rigid habit, with a stout rachis, the upper part of which is wholly concealed by the arrangement of the pinnæ. I regret that the exact locality of this Fern in Mexico is not stated.

17. A. *lobatum*, Pr.; "fronds oblong bipinnate pinnate at the apex glabrous, pinnæ and pinnules alternate petiolate oblong lunate rotundate lobato-incised crenulate, terminal ones subtrilobed, sori solitary lunate, involucres reniform."—*Presl, Reliq. Hænk. p.* 62, *t.* 10, *f.* 5.

Hab. Mexico, *Hænke.*—In size and general aspect this has so much the appearance of *A. Galeottianum* (from the same country) that I have been almost tempted to make that a synonym of the present species; but nothing is said about the texture, which in our *A. Galeottianum* is thick and subcoriaceous, and where, moreover, the pinnules are much more orbicular, and the sori more numerous and less lunate. Presl has omitted the present species in his 'Tent. Pteridograph.' Professor Kunze refers it to *A. Chilense.*

18. A. *Galeottianum*, Hook.; frond broadly lanceolate (a span long) pinnate lowermost pinnæ again pinnate, pinnæ subopposite all petiolate cordate or subrotund almost exactly equilateral coriaceous emarginate or truncated rarely subcuneate at the base the rest obscurely lobed with narrow soriferous sinuses, the margin slightly thickened all round, involucres reniform-cordate subcoriaceous situated at the bottom of the shallow sinuses, rachis and stipes rather stout ebeneous glabrous. (Tab. LXXX. B.)

Hab Mexico, near Oaxaca, elevation 3000 feet, *Galeotti*, n. 6561.—A very distinct species of *Adiantum*, and not taken up by Martens and Galeotti in their Syn. Fil. Mexic. Indeed, it appears to belong to a collection gathered subsequently, if I may judge from the high number it bears. Its nearest affinity is perhaps with our *A. Shepherdi*, but the arrangement and insertion of the pinnæ, as well as their shape, are very different; and the almost exactly equal sides of these pinnæ affords a striking character, especially among the coriaceous species of the Genus; but is not unfrequent in some of the thin herbaceous kinds, such as *A. Chilense* and *scabrum*, and there is an approach to it in the *A. deltoideum* among the species with a firmer texture.

19. A. *Ruizianum*, Kl.; "frond pinnate, pinnæ large reniform shortly attenuated into a petiole crenato-lobate, stipes and rachis compressed brown-black glossy glabrous, sori orbicular chestnut-brown glabrous." *Kl. in Linnæa*, xviii. *p.* 551.

Hab. "Andes of Peru, *Hb. Ruiz*, *n.* 26.—A foot high. Pinnæ an inch and a half, petioles an inch long, both glabrous; lobes 1½ line long." *Kl.* No remarks are given on the affinity of this species.

20. A. *diaphanum*, Bl.; root fibrous, fronds (4-5 inches) not rooting oblong attenuate pinnate lowermost ones some-

times again pinnated, pinnæ alternate approximate very membranaceous opaque dull brown bearing a few scattered black hairs semiovate slightly arcuate upper margins at the base truncated and parallel with the rachis, apex very rounded, superior margin lobed with deep and shallow sinuses and there bearing the sori distant from the margin or outline of the entire pinna, involucres small reniform-rotundate, stipes and rachis very slender ebeneous glabrous. (Tab. LXXX. C.).—*Blum. En. Fil. Jav. p.* 215.

Hab. Near Lingain Jattie, Province of Cheribou, Java, *Blume*. Luzon, *Cuming*, *n.* 55.—I am indebted to Dr. Blume for an authentic specimen of this most delicate of ferns, whether the slenderness of its stipes and rachis or the thinness of the pinnæ be considered. The able author compares it with the *A. rhizophorum*, Sw., observing that it differs in the want of an elongated rooting apex, and in the position and form of the sorus. It is also unlike in the shape and texture of the pinnules, in the greater length of the rachis, and in being somewhat bipinnate below, as is shown by Mr. Cuming's specimens, which are otherwise identical with Professor Blume's plant.

(*Rachis often proliferous at the extremity of the pinnæ.* 21—32).

21. A. *lunulatum*, Burm.; frond oblong pinnate, pinnæ alternate rather long-petiolate membranaceous oblong-lunate dimidiate below, upper margin lobed truncate at the base uppermost pinna cuneate, sori linear approximate and often confluent, stipes and rachis ebeneous glabrous the latter often extended beyond the pinnæ and proliferous.—*Burm. Fl. Ind. p.* 235. *Willd. Phytog.* xiv. *t.* 9. *f.* 1. *Sp. Pl.* v. *p.* 430. *Sw. Syn. Fil. p.* 121. *Hook. & Grev. Ic. Fil. t.* 104. *Wall. Cat. n.* 77. Pteris lunata, *Retz Obs.* ii. *p.* 28, *f.* 4. Adiantum arcuatum, *Sw. Syn. Fil. p.* 122. A. lunatum, *Cav. Præl.* 1801, *n.* 676.—*Rheede, Malab.* xii. *p.* 72, *t.* 40.

Hab. Throughout the hot parts of the East Indies; Malay Islands and Peninsula (*Wallich*), Ceylon, Java, &c., &c. Africa; Cape de Verde Islands, *Mr. Miller*. Quorra, near Attah, *Dr. Vogel* (Niger Expedition). S. America; Acapulco (*Willd.*); Mexico (*Hænke*). Organ Mountains, Brazil, *Gardner* (in Herb. nostr. without No.). Minas Geraes, *Claussen*. On the ruins of the old city of Panama, *Seeman*, *n.* 10.—This species is very constant to its characters in all the multitudinous examples I possess, whether from the Old or from the New World. In the latter country it seems to be very rare. The pinnæ vary from one inch to 1¼ inch in length: in their delicate palish green colour and membranous texture and rather long petioles the present and two following species resemble *A. Capillus-Veneris*. The involucres are, however, linear or linear-oblong, their length depending on the size of lobe they occupy; and, according as the sinus between the lobes is narrow or more or less broad, is necessarily the contiguity of the sori: sometimes the sori are lunate.

22. A. *deflectens*, Mart.; "rhizoma simple short, fronds pinnate sometimes rooting and gemmiferous at the extremity, petioles paleaceous at the base and as well as the rachis black glabrous, pinnæ transversely oblong or trapezoid, posterior sides rectilinear or with the interior side shorter rounded entire, anterior sharply toothed entire or here and there inciso-lobate, sorophorous lobules 1-5 orbicular-oblong." *Mart. Ic. Plant. Crypt. Brasil. p.* 94 (*note*).

Hab. Rough rocky banks of the Tapajoz, at Santarem, Province of Pará, *Martius*.—"*Plant* a span long. *Fronds* erecto-patent or arcuato-deflexed, rooting and producing new gemmæ. *Pinnæ* alternate, about twenty, lowermost 4-6 lines long, 2-3 lines wide, decidedly inciso-lobate, upper ones gradually decreasing in size and less incised. In habit very near *A. arcuatum*, Sw."—As the *A. arcuatum*, Sw. is now acknowledged to be the same as *A. lunulatum*, and as *A. lunulatum* is unquestionably a Brazilian plant, may not this be a state of it?

23. A. *dolabriforme*, Hook.; frond oblong pinnate, pinnæ alternate rather long-petioled membranaceous obliquely subrotundato-cuneate deeply cut into many narrow irregular generally bidentate lobes, sori rotundate or reniform, stipes and rachis ebeneous glabrous the latter often extended beyond the pinnæ and proliferous. *Hook. Ic. Plant.* ii. *t.* 191.

Hab. Natividade, Brazil, *Gardner*, *n.* 3553; Aracipe, on rocks in a shady ravine, n. 2019, and between Canabrava and Franquirra, n. 2392. Moist rocky places, Isthmus of Panama, *Seeman*.—An equally large plant as *A. lunulatum*, and as already observed, in Ic. Pl., l. c., approaching very near to that species: but specimens sent by Mr. Gardner at different periods, and from different localities, retain the above characters, *i. e.*, the lower and upper base of the leaflets are more nearly equal and straight, giving a cuneate form, rounded above and deeply cut into narrow lobes, with usually a tooth on each side the sorus. No such form appears in the numerous specimens of *A. lunulatum* from the East Indies. It appears to be not uncommon in some parts of Brazil, for Mr. Gardner observes that between Canabrava and Franquirra it bears the vernacular name of "*Venca*," and is used in pectoral complaints. A resemblance to *A. Capillus-Veneris* of the Old World no doubt suggested the idea to the early Spanish colonists of its supposed virtues. Seemann's specimens from Panama are smaller and exhibit the same distinctive characters as the Brazilian ones, but show an approach to *A. filiforme*, Gardn.

24. A. *rhizophorum*, Sw.; quite glabrous, fronds elongato-lanceolate often tapering into a long rooting and proliferous apex bare of pinnæ, pinnæ alternate short-petioled chartaceo-coriaceous (brown when dry) semiovate the upper base truncated and parallel with the rachis, superior margin lobed lobes retuse soriferous shining above, on both sides very minutely striated by the numerous compact veins, involucres reniform thick coriaceous, stipes ebeneous or red-

brown only a little chaffy, the rest as well as the rachis glabrous very glossy. (Tab. LXXX. A.).— *Sw. Syn. Fil. p.* 422 *&* 320. *Willd. Sp. Pl.* 5, *p.* 433. A. caudatum, *Bory, Itin.* i. *p.* 198 (*not Linn.*).—*β. major*; a foot to a foot and a half long.

Hab. Moist rocks and wooded hills, Mauritius and Bourbon, *Bory, Carmichael, Sieber, n.* 300, *Bouton, Bojer, Gardner, &c.*—*β.* Mountain at St. Denis, Bourbon (Herb. nostr. from the Museum of Nat. Hist. of Paris).—Difficult as this species may be to define in a few words, it is, however, truly distinct from *A. caudatum*, not only in being everywhere glabrous, but in the colour and texture of the pinnules, which are firm and almost coriaceous, and in the veins, which are here so delicate as to be seen only like fine and closely packed lines or striæ on the surface. I possess copious specimens from Mauritius and some from Bourbon, and perhaps it is confined to those islands. I have one individual of the true plant indeed from Dr. Wight, without any locality, labelled "*A. rhizophorum;* specimens, I think, of this are mixed among the *A. caudatum*," and my friend Dr. Arnott has added "Wight, Cat. 130 *d* (partim)," but no such plant is there. In size it is usually smaller than *A. caudatum;* but my Bourbon specimens from the Paris herbarium are larger than any *caudatum*, yet exhibiting all the characters of *A. rhizophorum*.

25. A. *soboliferum*, Wall.; everywhere glabrous fronds (a foot high often soboliferous, *Wall.*) broadly lanceolate pinnated, pinnæ submembranaceous sessile or lower ones only on very short petioles semielliptical slightly falcate obtuse the upper base truncated and parallel with the rachis upper margin rather equally lobed, sterile ones denticulate, lobes soriferous, sori subreniform, stipes ebeneous, rachis and stipes with a membranous margin on each side! (Tab. LXXIV. A.).

Hab. Mountains of Ava, *Dr. Wallich*, 1826.—Although my own specimens from the generous Wallich do not exhibit the radicant and stoloniferous character which suggested the name, it is quite natural that the species should be occasionally so, its nearest affinity being with *A. caudatum*, from which it is at once distinguished by its entirely glabrous fronds and stipes, and from that and all others by the decided membranaceous wing on both sides the rachis and stipes, most apparent, indeed, in the sterile specimens, but existing in all.

26. A. *caudatum*, L.; fronds linear-oblong elongated attenuated often rooting at the apex and there bare of pinnæ, pinnæ nearly sessile alternate rather thick membranaceous dimidiato-oblong the upper base truncated and parallel with the rachis the upper margin more or less deeply lobed, the lobes often bifid soriferous villous in every part with rufous hairs or more or less glabrous, veins generally prominent, involucres nearly orbicular or subquadrate hairy or glabrous, stipes generally short rather stout and as well as the rachis

more or less clothed with fulvous chaffy hairs.—*Linn. Mant. p.* 308. *Sw. Syn. Fil. p.* 122. *Schkh. Fil. t.* 117. *Willd. Sp. Pl.* v. *p.* 433. *Hook. Ex. Fl. t.* 104. *Burm. Zeyl.* viii. *t.* 5, *f.* 1. A. incisum, *Forsk. Ægypt. Arab. p.* 187. A. vestitum, *Wall. Cat. n.* 75. A. flagelliferum, *Wall. Cat. n.* 76 (*pinnæ narrower and more rigid*). A. hirsutum, *Bory, It.* i. *p.* 198. *Willd. Sp. Pl.* v. *p.* 432. *Wall. Cat. n.* 2176. A. Capillus Gorgonis, *Webb, in Hook. Niger Flora, (Spicil. Gorgon.), p.* 192 (*segments of the pinnæ a little larger and somewhat divaricated*).—*β.* pinnæ generally quite glabrous, the margin frequently ciliated. A. ciliatum, *Blume in En. Fil. Jav. p.* 215, *et in Herb. nostr.* (pinnæ rather more deeply cut than usual).

Hab. Apparently throughout all India, from Scinde (*Stocks, n.* 624, small), Madras (*Wight*, 131 *and n.* 130, *d*, pinnæ deeply cut the segments divaricating) 130, *c*, (small and old). Bengal, Nepal (*Wallich, &c.*), Behar (*Edgeworth*), Assam, Boutan, Mishmee Mountains (*Griffith, Jenkins*), Malay Islands, *Blume, Cuming, n.* 2921, *Lobb.* China, *Beechey, Millett;* Mauritius, Ceylon.—*β.* In the same countries as the hirsute form. Java, *Blume*, Madras, *Wight* (2-19 and 130 and 130 A.). Arabia Felix, *Forskall.* Cape de Verde Islands, *Forbes, Vogel.*—It were endless to enumerate the several varieties of this. The ordinary state of the plant is well represented by Schkuhr; and in the Exotic Flora above quoted; and the plant appears from age and locality often to become glabrous, with a dry and parched character, the under side of the segments of the pinnæ channelled (by the reflexion of the sides). The more beautiful state is what Willdenow calls *A. hirsutum*, when it has no elongated rooting extremity, but that has properly merged into *caudatum*, it being often rooting and proliferous at the end of a caudate rachis. It seems to inhabit all the warmer or hot parts of the Old World; and the *A. Capillus Gorgonis*, Webb, from the Cape de Verde Islands, is assuredly but a slight variety.—The caudex is rather stout and creeping, bearing wiry roots and tufted fronds. In the perfect state of this plant the colour inclines to deep yellowish olive-green (when dry) and the veins are rather distant and prominent; the rachis and stipes are stout and wiry, and always more or less clothed with soft spreading chaffy hairs.

27. A. *Edgeworthii*, Hook.; everywhere glabrous, fronds linear-oblong elongated attenuated and often rooting at the apex and there bare of pinnæ, pinnæ nearly sessile alternate dimidiato-oblong rather acute the upper base truncated and parallel with the rachis, superior margin obscurely lobed rather more so in the sterile pinnæ, indistinct lobes truncated and bearing the sori one on each lobe, sori oblong elongated approximate, stipes elongated slender and as well as the rachis ebeneous glabrous. (Tab. LXXXI. B.)

Hab. Adah Valley, in the Punjaub, near Mooltan, *M. P. Edgeworth, Esq.*, Sept., 1838.—Mr. Edgeworth, in his notes, observes of this "it is not *A. rhizophorum*" (for indeed the texture of the frond and venation are totally

different), "nor *A. caudatum*, Sw., nor *flagelliferum*, Roxb. n. 76," (for in those varieties of one and the same plant the fronds, and, especially, the stipes, are more or less clothed with fulvous hairs or chaff): "it differs from all in the integrity of the pinnæ." On these grounds I give it as distinct, though we need more copious specimens to see that it does not pass into *caudatum*. The texture is more truly membranous than in that species: the nerves are the same, but though conspicuous from the pellucid nature of the parenchyme, they are not prominent on the surface: the fertile pinnæ scarcely exhibit an appearance of lobes; and the contiguous sori form a pretty even line at the edge.

28. A. *calcareum*, Gardn.; fronds a span long pinnate oblong or lanceolate tapering rooting and proliferous at the extremity, pinnæ membranaceous nearly sessile upper ones dimidiate subtriangular, lower ones flabellate all deeply cut into oblong or cuneate narrow emarginate lobes, involucres reniform occupying the notch on the lobes, stipes and rachis ebeneous glabrous the latter rooting.—*Gardn. in Hook. Ic. Plant.* v. *t.* 467.

Hab. In clefts of calcareous rocks near Natividade, Province of Goyaz, Brazil, *Gardner*, n. 3551.—Although approaching to *A. filiforme*, and to small specimens of *A. dolabriforme*, this appears really distinct, and, but for the tender, membranaceous and glabrous fronds, it resembles the East-Indian *A. caudatum*, which has the lower pinnæ sometimes flabellate.

29. A. *pumilum*, Sw.; "frond (small) pinnate, pinnæ subrotund serrulate terminal one larger trapezoid, sori nearly solitary on the superior margin."—*Sw. Fl. Ind. Occ.* iii. *p.* 1703. *Willd. Sp. Pl.* v. *p.* 431. *Mart. Ic. Plant. Crypt. Brasil. p.* 94, *tab.* 56, *f.* 4.—*Plukn. Alm. t.* 251, *f.* 4 ("*haud male*," *Mart.*)

Hab. Trunks of old trees and shady rocks, Jamaica, rare, *Swartz*.—This little *Adiantum* is quite unkown to me. I have seen nothing that corresponds with it from Jamaica, the only recorded station, unless in calling it a "*planta Antillana*," Martius should intend it to be understood as inhabiting the Antilles generally. The figure of Plukenet, quoted by Swartz and Martius, is recorded by the latter as "haud male." To me that figure, destitute of fructification, has more the habit of an *Asplenium* than of an *Aspidium*; and it is unfortunate that, although Martius describes the fructification, he does not represent it, nor say from what source his specimens were derived. He gives the figure and the full character, to show its affinity to, as well as the distinguishing character of, his *A. delicatulum*; but it does not help us to understand Swartz's *pumilum*. If it has, as Swartz and Martius describe (though not so figured by Plukenet), a filiform, creeping caudex, it cannot be closely allied to Martius's *A. delicatulum*.

30. A. *filiforme*, Gardn.; fronds a span or more long pinnate lanceolate tapering almost all rooting and proliferous at the extremity, pinnæ membranaceous small alternate petioled distinct rather obliquely and broadly cuneate lobed and fim-

briato-serrate, young sterile ones obovate fimbriated, sori rotundate terminating a toothed or toothless lobe, stipes short and the rooting rachis ebeneous glabrous.—*Gardn. in Hook. Ic. Plant.* vi. *t.* 503.

Hab. Shady clefts of sandstone rocks near the city of Oeiras, Province of Piauhy, Brazil, *Gardner*, n. 2391. Montagne de Mahuri, Cayenne, *Le Prieur* (*in Herb. Hook.*)—Very different as it appears at first sight from *A. dolabriforme*, yet I must confess that recent investigation, and especially specimens lately received from Mr. Seeman of the latter, as mentioned under *A. dolabriforme*, have shaken my confidence in this as a species. Our figure above quoted is, however, a faithful representation.

31. A. *delicatulum*, Mart.; "rhizoma very short simple, fronds small slender pinnate, petiole and rachis filiform paleaceo-pilose at the base, pinnæ rather remote obovato-rhomboid equally cuneate at the base, upper margin rounded incised and subulato-dentate, sori in the anterior margin solitary or two orbicular-oblong." *Mart. Ic. Plant. Crypt. Brasil. p.* 93, *t.* 56, *f.* 2.

Hab. On stones in warm shady places in the district of the river Japura, Brazil, *Martius*.—It appears evident from Martius's well-executed figures, that the young state of the frond only with a very small (and as represented) solitary, imperfect sorus was seen: in this state we have exactly the young substerile fronds of *A. filiforme*, Gardn. The plant has a very different appearance when the fertile pinnæ and the rooting rachis appear, as shown in Hook. Ic. Plant. f. 503. Martius compares his species with the little known *A. pumilum*, Sw.

32. A. *rhizophylum*, Schrad.; "rhizoma simple short, fronds pinnate, petioles paleaceo-pubescent elongated and rooting at the apex, pinnæ glabrous subtriangular-flabelliform, the posterior margin straight, interior shorter, anterior rounded denticulate lobed and soriferous, lowermost ones wider and semiorbicular, sorophorous lobules linear-oblong glabrous." *Mart.—Schrad. in Gött. Gel. Anz.* 1824. *p.* 872, *n.* 4. *Mart. Ic. Pl. Crypt, Brasil. p.* 92, *t.* 62.

Hab. Shaded rocky places near the river Paraiba. Felisbert, between Almada and Ferradas, Brazil, *Martius*.—I have not seen any species exactly resembling this, which the learned Martius compares with *A. rhizophorum*, Sw. It is, however, it must be confessed, very near to Gardner's *A. calcareum*; so that were the pinnæ of this latter plant *entire*, instead of deeply cut, and the sori longer, it would be identical with the present plant of Schrader, a species I believe, though published in 1824, not taken up by any author since, previous to Von Martius.

§ III. *Fronds bipinnate, often in the younger state pinnate.* (33—).

* *Sori elongated, more or less continuous.* (33—38)

33. A. *incisum*, Pr.; fronds pinnate and lanceolate or bipinnate and then triangular-lanceolate, terminal pinna

large pinnules approximate tapering upwards gradually to a small point chartaceo-membranaceous scarcely glossy, sterile ones large (2 inches and more long) acuminate lobed and serrated, fertile ones and those of the simply pinnated and those of the terminal pinna large (1½—2 inches), those of the lower pinnæ much smaller, all lanceolate acuminate or acute arcuato-falcate coarsely serrated at the apex, upper base truncated parallel and close to the rachis often forming a sharp auricle, lower margin dimidiate, sori linear solitary arcuate generally confined to the base of the upper margin very rarely appearing on the lower, stipes ebeneous shining, rachis slightly rough with ferruginous hairs.—*Presl, Reliq. Hænk. p.* 61, *Tab.* 10, *f.* 3.

Hab. Guayaquil and Mexico, *Hænke;* apparently entirely confined to the Pacific side of Mexico and Columbia. I possess specimens, sent from Guayaquil, Solanga, Buba, and Gorgona, by *Messrs. Jameson, Hinds, Barclay* and *Seeman.*—Presl's figure is an admirable representation of this plant, in a state, intermediate, as it were, between the simply pinnate and the bipinnate form. In the more fully developed form, the pinnules of the lower pinnæ have a good deal of affinity with *A. pulverulentum*, but they are more falcate, while the sterile pinnules and those of the terminal pinnæ have quite a peculiar aspect, and are so large that I have measured some three inches long, they are singularly falcate and much and finely acuminated. I consider the species very distinct, and its circumscribed locality seems to strengthen the view of its being so. If it is a form of *A. pulverulentum* it would be likely to appear in other parts of tropical America, where that species is so abundant.

34. *A. pulverulentum*, L.; frond large (1—2 ft.) broadly ovate bipinnate, pinnæ lanceolate, pinnules close numerous gradually becoming smaller to the point shortly petiolate rather membranaceous than coriaceous full green glossy oblong dimidiate obtuse upper base truncate parallel with and close to the rachis lower ones deltoid uppermost ones very small narrow almost obovate, sori linear continuous only occupying the superior (or part of the superior) margin, rachis and stipes rough with ferruginous hairs.—*Willd. Sp. Pl. p.* 446. *Sw. Syn. Fil. t.* 119 (*good*). *Plum. Fil. t.* 5, *f.* 7. A. umbrosum, *Willd. Sp. Pl.* v. *p.* 447 (*Pr.*). A. monosoratum, *Willd. l. c. p.* 445? A. Kunzeanum, *Pr. Tent. Pterid. p.* 157? (*name*).

Hab. West Indian Islands, frequent; Tropics of America, as Mexico, New Grenada, Guiana, and Brazil.—A more tender and membranaceous plant than *A. villosum*, with smaller, more copious and much denser pinnules, tapering gradually to the narrow point, obtuse, except when sterile and bearing a solitary line of fructification on the upper margin only, and generally not occupying the whole length of that. Presl makes a new species (*A. Kunzeanum*) of Kunze's *A. pulverulentum* from Cuba (*Poeppig*); but as my specimen of Poeppig's plant in no way differs from the true *pulve-*

rulentum, I venture to reduce Presl's *A. Kunzeanum* to a synonym in this place.—*A. microphyllum*, Kaulf. and Kze. in Herb. nostr., from Cuba also (*Poeppig*), much resembles small specimens of the present plant; but the stipes and rachis are truly muricated.—The figure in Sloane of the *A. serrulatum* of Swartz, Jam. 2, t. 37, f. 2, agrees with the simply pinnated forms of this species.

35. A. *serrulatum*, L.; "fronds pinnate or bipinnate, pinnæ oblong-lanceolate dimidiate truncate at the base serrulate, upper margin bearing the sori, stipes glabrous."—*Willd.—Linn. Sp. Pl. p.* 1557. *Sw. Syn. Fil. p.* 122. *Fl. Ind. Occ.* iii. *p.* 1709. *Willd. Sp. Pl.* v. *p.* 436. *Sloane, Jam.* i. *t.* 35, *f.* 2 (*frond simply pinnate*).

Hab. Jamaica, *Swartz.*—I quote the synonyms, as I find them in Swartz and Willdenow. Plukenet's figure may be anything. Linnæus only refers to Sloane, and that is really a good representation of an unbranched state of *A. pulverulentum*. Presl does not notice this species.

36. A. *villosum*, L.; frond large (1—2 ft.) bipinnate, ultimate pinnæ longest, pinnules nearly sessile approximate or crowded oblong-ovate or ovate-lanceolate subcoriaceous glossy blackish green obtuse or acuminate the lower margin dimidiate upper base truncate parallel with and close to the rachis, ultimate pinnule larger than the rest rhombeo-acuminate, sori continuous generally occupying the whole margin except the lower dimidiate portion, rachis and stipes rough with chaffy brown hairs.—*Willd. Sp. Pl.* v. *p.* 444. *Swartz, Syn. Fil. p.* 124. *Schk. Fil. tab.* 120.—*β.* sori very broad with the copious capsules.

Hab. West Indian Islands, Trinidad, Jamaica, St. Vincent, Cuba, New Grenada, and Guiana.—*β.* Trinidad, *Lockhart.*—The figure of Schkuhr above quoted is a faithful resemblance of a rather luxuriant state of this plant; but more frequently the pinnules exhibit the form of what may be called an oblique parallelogram, and are then generally more crowded. I do not find that this is an inhabitant of Brazil or anywhere south of the line. Sloane's figure, Jam. *vol.* ii. *t.* 37, *f.* 2, is not a bad representation of a broad pinnated state of *A. villosum*, although quoted by Swartz and Willdenow for *A. falcatum*. From French Guiana (*Le Prieur*) I possess specimens with the fronds 2—3 ft. long, of a more membranaceous texture, the pinnules closer, the ultimate ones very small, the fructification often confined to the upper margin, in these latter respects seeming to pass into *A. pulverulentum*. There are indeed, I fear, many intermediate states. My specimen of Poeppig from Cuba (*Kze. in Linnæa*, ix. *p.* 79) marked *A. villosum*, L. by Kunze, is clearly not the true plant, but *A. triangulatum*, Kaulf.

37. A. *varium*, H. B. K.; "fronds pinnate and bipinnate, pinnæ trapezoideo-oblong acuminate sharply serrated subpetiolate glabrous, rachis hirsute with piliform scales, sori linear continuous."—*H. B. K. Nov. Gen. Am.* i. *p.* 16, *and* vii. *t.*

667. *Willd. Sp. Pl.* v. *p.* 435. A. fructuosum, *Kze.*, and A. tetraphyllum, *Sieb., Syn. Fil. n.* 158 (*according to Presl*).

Hab. Near Caripé, Venezuela, *Humboldt.*—Humboldt and Kunth say of this "an idem cum *Adianto villoso?*" Willdenow says "ab *A. villoso* diversum, fronde simpliciter pinnata bipinnatave, pinnulis non trapeziis acuminatis, soris semper continuis."—Presl retains it as a species, and refers to it *A. fructuosum*, Kze., and *A. tetraphyllum*, Sieb. Syn. Fil. n. 158. Of the latter I possess an authentic specimen, and have little hesitation in pronouncing it a small state of *A. villosum*, of which the plant under consideration is perhaps an unusually large form.

38. A. *falcatum*, Sw.; "fronds pinnate or bipinnate, pinnules at the base above rectangular trapezoid acuminate falcate serrated at the apex, sori on the superior and anterior margin continuous." *Sw. Syn. Fil. p.* 123. *Fl. Ind. Occ.* iii. *p.* 1715. *Willd. Sp. Pl.* v. *p.* 435. *Sloane, Jam.* i. *t.* 53, *f.* 1. *Pluken. Alm.* ii. *t.* 253, *f.* 1.

Hab. Jamaica, *Swartz.*—This Swartzian species, again, like *A. serrulatum* and *denticulatum* of the same author, is omitted in Presl's Tentamen Pteridographiæ. Sloane's and Plukenet's figures quoted by Swartz, and which are perhaps the best authority for the present plant, might, I think, be safely referred to *A. villosum.*

** *Sori short, equal or nearly so (not continuous).* (Sp. 39—54.)

39. A. *obtusum*, Desv.; 1—2 feet high (frond dark brown when dry) bipinnate, pinnæ distant lanceolate attenuated scarcely acuminated, pinnules rather distant coriaceo-chartaceous glabrous glossy above dimidiato-oblong very obtuse and rounded at the apex upper base truncated sometimes slightly falcate sterile ones denticulato-serrate in the upper margin and round the apex, sori copious approximate semioval or semiorbicular thick corneous extending round the apex, stipes ebeneous glabrous but a little rough to the touch, rachis ferrugineo-tomentose.—*Desv. in Berl. Mag. p.* 327. *Hook et Grev. Ic. Fil. tab.* 188. A. cassioides, *Desv.* (*Kze*).—*β.* pinnules larger and more elongated and more obliquely cuneate at their base.

Hab. Tropical America, frequent. Brazil, *Gardner*, n. 71, Guiana, Jamaica, and other West Indian Islands. Cumana, *Funck*, n. 193, "*A. rhomboideum.*" Myobamba, Peru, *Mathews.*—*β.* Trinidad, *Baron de Schach, Lockhart.* St. Vincent's, *Rev. L. Guilding.* French Guiana, *Le Prieur.* Brazil, *Gardner*, n. 3550. Bay of Choco, West Coast of Columbia, *Hinds.*—Characteristic as is the figure we have quoted in the 'Icones Filicum' of the ordinary state of the plant, yet I possess forms of it much at variance with that figure, having much larger, and in proportion much longer pinnules, with more copious sori; and Kunze observes (Linnæa, 1848, p. 223) of this fern, "Variat pinnulis majoribus et minoribus, modo imbricatis (*Ad. cassioides*, Desv.) modo remotiusculis." Again the sterile plant has a still different appearance, with somewhat trapezoid pinnæ, broader at the base, and much thinner texture. An indifferent spe-

cimen of this kind with very imperfect fructification, marked "*A. Kunzei Miq.* (Surinam)," I possess from Dr. Miquel. Under *A. obtusum*, Kunze, in 'Linnæa,' l. c., refers to this, where he says in a note, "*A. Kunzei*, Miquel in Diar. Inst. Reg. Bat. a. 1843, p. 5, f. 1, et *Ad. hirtum*, Splitz. in Tydschr. voon Naturl. Gescheids, en Phys. t. 7, p. 40 (non Klotzch), sunt species mihi nondum visæ."

40. A. *hirtum*, Kl.; rather small, fronds bipinnate, pinnæ 10—14 or 15 linear-lanceolate acuminate patent, pinnules numerous dark green glaucous and concave beneath chartaceous dimidiately oblong very obtuse approximate villous with rufous hairs beneath truncated at the superior base, lowest pinnules subrhomboid, terminal one narrow trapeziform superior margin and apex crenato-serrate, lobules soriferous, sori copious small close-placed, involucres oblong-reniform often jagged at the margin, stipes ebeneous nearly glabrous smooth, rachis ferruginous subtomentose. (Tab. LXXXII. A.) *Klotzsch, in Linnæa*, xviii. *p.* 563. "A. terminatum, *Kze. n. sp.*" . *Moricand, Herb. Braz.* A. striatum, *Hook. in Spruce, Herb. Amaz. n.* 14 (non Schk).

Hab. British Guiana, *Richard Schomburgk, n.* 1144, *Kl. in Herb. J. Sm.* Surinam, *Hostman, n.* 843 and 94, and *Herb. Miq. n.* 1172 (*in Herb. Hook.*). Brazil, Ilhios, *Moricand.* Parà, *Spruce, n.* 14, *var.?* Panama, *Seeman* (sterile. Pinnæ glabrous).—I have drawn up my character and made the figure from Klotzsch's specimen; and all my other specimens from the several localities above-mentioned precisely accord with it, save the var.? noticed from Panama, which seems to differ only in having the pinnules destitute of any villosity.

41. A. *Cayennense*, Willd. mst.; large, fronds bipinnate, pinnæ oblong-lanceolate subchartaceous acuminate patent, pinnules subdimidiato-oblong (almost a parallelogram) deorsely subfalcate full green very dense rather shining truncate at the base, superior margin and apex coarsely crenate serrulate in the sterile ones, lobules soriferous, involucres oval-oblong approximate regular 9—12, ultimate pinnule lanceolate much acuminated serrated, lowest ones flabellate, rachis stout, densely clothed with rusty hairs, stipes triangular black with dense deciduous hairs. (Tab. LXI. A.).—*Klotzsch, in Linnæa*, xviii. *p.* 552. *Kunze, in Linnæa*, 1848, *p.* 223.

Hab. British Guiana, *Rich. Schomburgk, n.* 1201. *Klotzsch in Herb. J. Sm.* Surinam, *Keppler.* Dry sunny places, Serra de Araripo, Brazil, *Gardner, n.* 1906.—β. pinnules narrower. British Guiana, *Sir R. Schomburgk.* Cayenne, Montagne de Malveri, *Le Prieur, in Herb. nostr.* Tumaco, Central America, Pacific side, *Hinds.* Jamaica, *Dr. Distin.*—Whether this be a species or not, I feel no hesitation, (having seen an authentic specimen) in considering Mr. Gardner's 'Lindsæa,' n. 1906, as identical with it, and also in pronouncing some otherwise puzzling plants from Cayenne, Central America and Jamaica, to be varieties having narrower pinnæ. It is a rather large species (frond 1½ to 2 feet) with stipes and rachis stout, very tomentose,

the pinnules close-placed, rather chartaceous than membranaceous, large (for this group), very obtuse, in shape, if I may so express myself, almost a four-sided parallelogram, but with a downward curvature (deorsum falcatæ): the sori moderately large, oval-oblong, close-placed, very regular, often extending round the apex, and from 9 to 12 or 13 on a pinna.—A still smaller state of this plant, as I am disposed to consider it, is the *A. Schomburgkianum*, Klotzsch in Herb. J. Sm. n. 1184, from British Guiana.

42. A. *Klotzschianum*, Hook.; large, fronds bipinnate, pinnæ lanceolate shortly acuminate, pinnules dimidiato-oblong obtuse submembranaceous dark green (almost an oblique parallelogram) deorsely subfalcate, very obscurely crenate truncate at the upper base, the small blunt teeth soriferous, involucres exceedingly numerous oblong-reniform or semi-orbicular approximate very regular 17 to 24, rachis slender compressed downy on the upper side dark purple shining and glabrous beneath, stipes long erect stout ebeneous with a faint line of hairs on one side, caudex creeping stout. (Tab. LXXXII. C.) A. tomentosum, *Klotzsch, in Linnæa*, xviii. *p.* 553. *Kze. in Linnæa*, 1848, *p.* 224. A. Brasiliense? *Hook. in Spruce, Herb. Amaz. n.* 51. A. politum, *J. Sm. in Hook. Lond. Journ. of Bot.* i. *p.* 198 (*not Humb.*)

Hab. British Guiana, *Rich. Schomburgk, n.* 1202, *Klotzsch, in Herb. J. Smith*). *Sir R. Schomburgk, n.* 349 (in Herb. J. Sm. and Hook., from the Berbice). Surinam, *Keppler*, n. 1773, c. (Kunze).—This I consider a very good, and it assuredly is a very fine species and worthy of bearing Dr. Klotzsch's name, to which, by the right of priority, indeed, it is by no means entitled; but the appellation *A. tomentosum* is quite inapplicable to a plant which has no further approach to tomentum than a delicate down or pubescence on the upper surface of the compressed rachis; whereas the preceding species, next to which Dr. Klotzsch has justly placed it, and its closest ally, *A. Cayennense*, Kl., have the rachis all over, and the stipes too, densely *fusco-* (paleaceo) *tomentose*. So that till I read the descriptions more carefully I imagined that the authentic names of the specimens in Mr. J. Smith's Herbarium had been transposed. Kunze, however, in the 'Linnæa,' l. c., strangely separates these two plants, &c., placing between them *A. villosum* (a *monosorous* species, if the true plant is intended, whereas the sori are, here, according to Klotzsch, 18—22 on a pinnule), and *A. pachysorum* (the same as *A. prionophyllum*, according to Presl); and Kunze further says, "Distinctissima species. Rhizoma illi *Ad. Cayennensis* simile, phyllopodia breviora, alterna, magis remota, ferrugineo-paleacea, radiculæ frequentiores. Stipites basi non adscendentes, sed stricti, sparsim ferrugineo-paleacei." Mr. Spruce's specimen, which is perfect, corresponds precisely with Dr. Klotzsch's. Both have the decurvo-falcate pinnules very crowded; but the sori and rachis are quite different.

43. A. *prionophyllum*, H. B. K.; often large (1—2 feet and more), frond rather compact bipinnate, pinnæ 5—11 lateral ones horizontal terminal one elongated all commonly caudate at the extremity, pinnules approximate so as gene-

rally to touch each other horizontal membranaceous or subcoriaceous dark green rather glossy oblong slightly hairy beneath anteriorly falcate obtuse or acuminate slightly petiolate superior base truncate and parallel with the rachis obtuse, upper margin and apex incisely lobed, terminal narrow linear elongate caudate incised, sori several 6—9 along the upper margin approximate short oblong rather small, stipes angled and as well as the rachis everywhere clothed with rufous chaffy hairs.—A. prionophyllum, *H. B. K. Nov. Gen. Am.* i. *p.* 16. *Hook. in Spruce, Herb. Amazon. n.* 49. A. tetraphyllum, *Willd. Sp. Pl.* v. *p.* 441. *Klotzsch, in Linnæa*, xviii. *p.* 1551. *Miquel, in Herb. nostr.* A. ternatum, *Willd. Sp. Pl.* v. *p.* 436 (*according to Presl, who quotes the n.* 20075, *in Herb. Willd., which Dr. Klotzsch, in Linnæa*, xviii. *p.* 551, *retains as a distinct species).* A rigidum, *Link Fil. Sp.* 59, *not Presl* (*according to Klotzsch*). A. fructuosum, *Link Hort. Berol.* ii. *p.* 14, *not Kunze* (*according to Klotzsch*). A. elatum, *Desv.* (*according to Presl*). A. pachysorum, "*Reich. in Plant. Surin.*" (*Presl*).

Hab. Tropical America.—"Caripé, Prov. Cumana, *Humboldt and Bonpland.* Martinique (*small*), *Sieber n.* 196, *in Herb. nostr. and n.* 370, *in Herb. J. Smith.* Trinidad, *Baron de Schach, Aldridge.* Jamaica, *Wiles and others.* Surinam, *Miquel.* Esmeraldas, *Seemann.* Tumaco, *Hinds.* —*β.* pinnules chartaceous or almost coriaceous. Guadeloupe, *Le Prieur*, (*Herb. nostr. Mus. Paris.* Adiantum, *n.* 4). Trinidad, *Lockhart*, (pinnules less outward). St. Vincent, *Rev. L. Guilding* (*one form approaching* A. intermedium, *but glossy and not glaucous.*) Jamaica, *Dr. Bancroft.*—*γ.* pinnules shorter, chartaceo-membranaceous, approaching our *A. fructuosum.* Esmeraldas, *Seemann.* Fernando Po (African Island), *Vogel.*—I have unfortunately no means of determining what *Adiantum* is the *tetraphyllum* of Willd., or the *prionophyllum*, H. B. K., having seen no authentic specimen: in the above synonyms I have been chiefly guided by my excellent friend, Dr. Klotzsch, who has made the Filices an especial study, and who is familiar with the species of Willdenow and Link; otherwise I should not have ventured to have adduced the *A. rigidum*, Link, Fil. Sp. (*fructuosum* of his Hist. Berol.) which the author states (probably in error) to be a *Chilian* plant. Dr. Klotzsch assures us (no doubt correctly) that Link's plant is not the *fructuosum* of Kunze, although Link refers to Kunze's "excellent" figure, nor the *A. rigidum* of Presl, although Link quotes Presl as authority, and Presl, under his *A. rigidum*, quotes the *A. fructuosum* of Link in Hort. Berol. Such are the different views that different botanists take of one and the same Fern, and which cannot but perplex the student. I think, however, it may be inferred that *A. fructuosum* of Spreng. and Kze. is a very nearly allied species to, if not identical with, *A. tetraphyllum;* and my *A. fructuosum*, named by Miquel *A. tetraphyllum*, strengthens such an opinion. Yet *A. fructuosum*, according to Presl, seems to have been misunderstood by Kunze himself; for that species of Kunze (meaning I presume that described by Linnæa, v. 11, p.

81) is referred to *A. varium*, Humb. (Nov. Gen. Am. vi. p. 16, f. 667) a species with continuous sori; while the *fructuosum* of Kunze "in Poeppig, Fil. Cub. nec in descr." constitutes a new species with Presl, *A. macrocarpum*, Pr. Again *A. pachysorum*, Reichenb., referred hither by Presl, is maintained as a good species by Kunze in Linnæa, 1848, and compared by him with *A. villosum*, L. It will thus be seen how difficult it must be, for any who has not the opportunity of consulting the Herbaria of Berlin, to ascertain what is the true *A. prionophyllum*, H. B. K. I have been guided by Dr. Klotzsch's reference to Sieber's "n. 196, Synopsis Filicum, from Martinique." This is identical with my plant from the Amazon, Mr. Spruce, n. 49, and with a Surinam specimen from Dr. Miquel; and from them I have drawn up my character. I possess, however, a host of specimens exhibiting forms which, if seen separate, might well be supposed to constitute distinct species, but among which there are intermediate states, and states, too, which seem to me (and I may say also to the very practised eye of Mr. J. Smith) to form connecting links with what the ablest botanist have deemed quite distinct. All that I have brought here have the pinnules elongated and more or less falcate, the curvature pointing upwards. No figure could do justice to this Fern, except on a very large scale.

44. A. *rhomboideum*, H. B. K.; "fronds bipinnate, pinnules subrhomboid shortly petiolate upper margin subcrenate glabrous exterior angle obtuse, rachis hairy with piliform scales, stipes glabrous, sori numerous oblong." *H. B. K., Nov. Gen. Am.* i. *p.* 16. *Klotzsch, in Linnæa*, xviii. *p.* 551. (Dr. Klotzsch makes 2 vars.? "*α. laxum*; pinnis patentibus laxis. A. serrato-dentatum, *Willd. Sp. Pl.* v. *p.* 445.—*β. strictum*; pinnis erectis strictis. A. rigidum, *Presl, in Herb. Berol.*" (*an Tent. Pterid?*).

Hab. Caripé, Venezuela, *H. B. K.*—Brazil, *Willd.* Essequibo, *R. Schomburgk.*—*β.* Cumana, *Moritz*; British Guiana, *R. Schomburgk.*—Whatever the *A. rhomboideum* is, the var. *β.* of Klotzsch, or *A. rigidum* Pr., ought, if Presl knows his own species, to be the *fructuosum* of Link, Hook. Berol., and that, according to Link, the *fructuosum*, Kze. in Schkuhr, Suppl. Tab. 15. But I have already, under *A. prionophyllum*, had occasion to observe how the learned differ on this knotty point. Both Presl and Klotzsch retain this as a species.

45. A. *laxum*, Kze.; "frond bipinnate lax, pinnules subsessile rhomboid obtuse superior base truncated lower one straight superior and exterior margin of the sterile ones duplicato-serrate subincised, sori oblong subcontiguous, rachis and stipes hairy." *Kze. in Linnæa*, ix. p. 79.

Hab. Roots of trees, Cuba. *Poeppig* (*Kunze*).—"Circumscription of the frond ovate, pinnæ distant generally 6, oblong acuminate, lowest pinnules abbreviated subflabellate, outermost one rhombeo-lanceolate. Texture of the frond membranaceous, glabrous, veined, resembling *A. intermedium*, Sw. (A. fovearum, *Raddi*, A. triangulatum, *Klfs.*), but differing much in the form of the pinnules."—*Kze.*

46. A. *Hænkeanum*, Pr.; "pinnæ alternate petiolate ob-

long-lanceolate acute sharply and unequally serrated the superior base truncate rotundate, lower one cut off, sori on both margins oblong, rachis villoso-paleaceous." *Presl, Reliq. Hænk. p.* 62.

Hab. Guayaquil, *Hænke.*—"Affine *A. vario* et *prionophyllo*, Humb., sed magnitudo frondis, serratura pinnularum, et conditio sororum pro nova specie certant."—*Presl.*

47. A. *fructuosum*, Spr.; "frond ovato-oblong membranaceous rather firm bipinnate, pinnæ alternate petiolate erecto-patent (or patent) elongated lanceolato-linear acuminate, fertile pinnæ dimidiate oblong the apex obtuse or rounded the base above truncate lowest ones subflabellate entire, ('margine superiore exterioreque, superioribus, margine superiore crenatis,') crenatures sorophorous, sterile and superior oblong subfalcate the upper and exterior margin duplicato-serrate or incised, sori about 6 large oblong subcontiguous, involucres canescent, rachis and long angled stipes stout ebeneous rufous-hirsute." *Kze. Spreng. Syst. Veget.* iv. *p.* 113. *Kunze, Syn. Fil. Poep. Linnæa*, ix. *p.* 81, *and in Schkuhr, Fil. Suppl. p.* 28, *t.* 15. A. macrocarpum, *Presl.* A. prionophyllum, *Martens & Gal. Syn. Fil. Mex. p.* 69, (*not H.B.K.*)

Hab. Tropical America, *α. strictum.* Cuba, *Poeppig.* Vera Cruz, Mexico, *Linden*, n. 78. Cordillera of Oaxaca, *Galeotti*, n. 6416. New Grenada, *Cuming*, n. 1183. Brazil, *Gardner*, n. 3549.—*β. laxius*; pinnæ subflexuose, pinnules less close, fructifications smaller. Berbice, *Sir R. H. Schomburgk.* Guiana, *Parker.*—It has not been difficult to find plants in my herbarium quite corresponding with the excellent figure of *A. fructuosum*, Kze. in his Supplement to the Filices of Schkuhr; but whether *A. fruct.* be really and permanently distinct in all its characters (and I have taken Kunze's own specific character) is another matter. It is chiefly distinguished from our *A. prionophyllum* by the large and few sori, and by the involucres being generally pale-coloured, canescent, but not downy (though sometimes hirsute), and by the fertile pinnules more obtuse, and not having an upward curvature. I find it gradually passing into what I have called var. *β.*; and that seems sometimes, on the one hand, so to merge into the var. *γ.* of *A. prionophyllum*, that I have been doubtful to which of these species I should refer that form, while small specimens again border upon our *A. obtusum.*

48. A. *urophyllum*, n. s.; frond large (1½ foot) bipinnate ovate acuminate erect stiff, pinnæ 5—7 petiolate erecto-patent incurved broad lanceolate with a very long slender caudate point, pinnules brownish-green rather opaque glabrous almost quite sessile approximate subimbricate especially at the base oblong falcate (curved upwards) chartaceous acute or acuminate crenato-lobate at the apex and upper margin, superior base truncate or slightly rounded and lapping over the rachis, small rounded lobes soriferous,

involucres semiorbicular small not contiguous but at regular distances and often extending round the apex, stipes and rachis ebeneous perfectly glabrous. (TAB. LXXXIV. B.).

Hab. Pacific side of Tropical America.—Island of Gorgona, *Barclay, Hinds.* Salango, *Seemann.*—A very fine, and, I believe, very distinct species: specimens from three collectors exhibit not the slightest variation. The habit is that of our *A. prionophyllum;* but the fronds and pinnæ are much larger, of a stiffer and more rigid habit than the normal state of that species, the pinnæ are petiolate (or bare of pinnæ for half an inch or an inch) below, the pinnules invariably very approximate regularly crenato-lobate (not toothed or serrated) the upper ones gradually smaller obliquely cuneate and terminating in a long tail-like point, narrow and slender, two inches long: the involucres are small, placed at regular distances, and in old specimens they stand out erect (being reflexed from their natural position) at the apex of a lobule, and look as if placed on a broad stalk; and the rachis and stipes are entirely destitute of hairs or chaffy scales.

49. A. *intermedium*, Sw.; frond bipinnate, pinnæ about 5—7 lateral ones horizontal terminal one elongated, pinnules subpetiolate chartaceous ovato-oblong obtusely acuminate obliquely cuneate at the base, upper base parallel with the rachis dull green glaucous beneath sterile ones obscurely lobate serrate, sori copious approximate, involucres oblong subfalcate, stipes 3-angular ebeneous, rachis ferrugineo-hirsute, caudex creeping elongated paleaceous.—*Sw. in Act. Holm.* 1817, *p.* 76. A. fovearum, *Raddi Fil. Bras. p.* 53, *t.* 77 (*good*). *Link Fil. Hort. Berol. p.* 68. A. Brasiliense, *Link Hort. Berol.* ii. *p.* 13 (*non Raddi*). A. argutum, *Splitzgerb. Tydschrift voor Naturl. Gescheid.* vii. *p.* 39.

Hab. Tropical America, frequent, especially in Brazil (*Gardner, n.* 2758, 1228). Ilhios (*Moricand*, A. triangulatum). Guiana, frequent. Amazon, *Spruce, n.* 48, "in vicinibus Parà, July, Aug. 1849." New Grenada, *Linden* (*n.* 259). Mexico, *Jurgensen, n.* 765. *Galeotti, n.* 6491, *Linden, n.* 78. Guayaquil, *Hartweg, n.* 706. Peru, *Matthews, n.* 1857 (larger and less glaucous). West Indian Islands. Jamaica, *Dr. Distin, &c.* Trinidad (*cult. in Hort. Liverp.*) less glaucous). Dominica, *Dr. Imray.* Guadeloupe, *L'Herminier.*—I follow Presl in considering the *A. fovearum* of Raddi, which is an excellent representation of our plant, to be the *A. intermedium* of Swartz, in Act. Holm.; although that author does not notice the glaucous underside of the pinnules, which, if not an invariable character, is very nearly so. Professor Kunze well observes of this species, "magnitudine et forma pinnularum, plus minus attenuata, variabilis, tamen facile recognoscenda." Yet even with many of the best marked species of ferns there are puzzling states; and we have specimens of this which border very closely upon *A. prionophyllum* or *A. fructuosum.* Kunze, as well as Presl, refer hither the *A. triangulatum* of Kaulfuss, which I have ventured to keep distinct. Frond 6—8 inches to a foot long, with the stipes equal in length or longer.—Kunze, in Linnæa, 1848, p. 222, says, in a note at the close of his observation upon *A. intermedium*, "Hic inserendum *Ad. tetraphyllum*, H. B., Klotzsch, Linnæa, p. 351, Miquel," &c. But whether he thereby means it to be understood that *A. tetraphyllum* should

be considered a synonym of *A. intermedium*, or that it should rank next it, I do not know.

50. A. *glaucescens*, Kl.; frond bipinnate, pinnæ about 5—9 lateral ones horizontal terminal one elongated, pinnules subpetiolate membranaceous oblong-dimidiate obtuse very glaucous beneath lower margin straight for its whole length upper base truncate and parallel with the rachis upper margin when sterile scarcely lobed or serrated fertile one slightly lobed, sori on the lobes of the upper margin distinct but approximate, stipes and rachis slender black ebeneous very glossy and glabrous, rhizoma very short thick, fibres tufted.—*Klotzsch in Linnæa*, 1844, *p.* 552, and in *Herb. J. Sm.*—*β.* larger, less glaucous, rachis with very sparse minute chaffy hairs.

Hab. British Guiana, *Rich. Schomburgk* (*Klotzsch*) and *Sir Rob. H. Schomburgk* (*in Herb. nostr.*). French Guiana, (*Delessert in Herb. nostr.*) Near Pará, Brazil, *Spruce*, n. 46, and *β.* No. 48, "Tanaii ad Rio Acara, juxta Pará."—The delicate membranaceous frond and slender, graceful, very glossy and glabrous stipes and rachis of this fern, with its obtuse and differently shaped pinnules, seem to distinguish it from *A. intermedium*; and our Guiana specimens from two localities exactly correspond with Dr. Klotzsch's plant in Herb. J. Smith. Our No. 46, too, of Mr. Spruce from the Amazon, is equally identical, and the short thick rhizoma, tufted fibrous root (no creeping caudex), unknown to Dr. Klotzsch, would seem to confirm the specific identity. Our n. 48, from Mr. Spruce, however, from Tanaii (another 48 of the same able botanist is *A. intermedium*), has a stouter stipes, larger frond and a few scattered hairs on the rachis, but otherwise agrees with *glaucescens*: its root was not seen.

51. A. *triangulatum*, Kaulf.; frond bipinnate, pinnæ 5—9 terminal one elongated, pinnules subpetiolate chartaceous dark green on both sides rather glossy ovato-oblong subfalcate (curved upwards) obtusely acuminate obliquely cuneate at the base, upper base truncate and parallel with the rachis, sterile serrulate scarcely lobed, sori oblong nearly equal sublunate approximate, stipes triangular and rachis rather woolly with ferruginous hairs deciduous on the latter.—*Kaulf. En. Fil. p.* 204. *Klotzsch in Linnæa*, xviii. *p.* 552 (*excl. syn.* A. fovearum, *Raddi?*) A. villosum, *Kze. Fil. exsicc. Poepp.* (*an Kze. in Linnæa*, ix. *p.* 79?)—*β.*? pinnules much larger and more elongated.

Hab. Brazil (*Kaulfuss*). Salango, Columbia, *Hinds.* British Guiana, *Rich. Schomburgk* (*Klotzsch, in Herb. J. Smith, n.* 252.) Jamaica, *Wilson, Mc Nab.* Guadeloupe, *L'Herminier.* Cuba, *Otto* (*Klotzsch, in Herb. nostr. n.* 243.) Maynas, Peru, (*Poeppig*). Esmeraldas, *Seemann.*—*β.* Trinidad, *Aldridge.*—I am aware that Presl and Kunze consider the *triangulatum* of Kaulfuss to be identical with *A. intermedium*, Sw., and *fovearum* of Raddi; and though Dr. Klotzsch retains it as a species (distinct from *inter-*

medium) he yet pronounces *A. fovearum*, Raddi, to be a synonym. If Dr. Klotzsch's specimens which we have received be the true plant of Kaulfuss, I am inclined to keep it separate from *intermedium*, though it is very closely allied. It still more nearly resembles the *A. villosum*, L.; and our specimen from Maynas, gathered by Poeppig, is inscribed by Kunze with that name. The sori are, however, here copious and nearly equal, though contiguous, but not continuous.—What I call var. *β.*? may be something very different: it exists in Mr. J. Smith's Herbarium, and has the pinnules 2 inches and 2¼ long, and narrow: in other respects it resembles our *triangulatum*.

52. A. *denticulatum*, Sw.; "fronds pinnate or bipinnate, pinnules trapezoid oblong acuminate subcrenato-denticulate the upper margin soriferous."—*Sw. Fl. Ind. Occ. p.* 1711. *Syn. Fil. p.* 123. *Willd. Sp. Pl.* v. *p.* 434. Adiantum latifolium, *Lam. Encycl. excl. syn. Plum. Fil. t.* 52, *simple. Pluken. Alm.* ii. *t.* 252, *f.* 5, *Sw., also simple and without fructification.*

Hab. Jamaica, *Swartz*. Martinique, *Plumier*.—Most recent botanists are silent on the subject of this fern, and Presl excludes it from his catalogue. The figures referred to by Swartz are very unsatisfactory: both represent the fronds simply pinnate, Plumier's figure alone has fructification: each pinnule exhibits 3 large lunulate sori. Swartz notices its affinity with the *A. serrulatum*, for which Sloane's figure 1, *t.* 35, *f.* 2, is quoted, but which appears to be a simply pinnated state of *A. pulverulentum*, of the monosorous group. This would seem to have distinct and equal sori.

53. A. *proximum*, Gaudich.; fronds bipinnate, pinnæ 9 or 10 alternate, pinnules oblong dimidiate truncate at the base villous beneath, sterile ones with the superior margin and apex dentato-subserrate, serratures denticulate, fertile ones entire ovato-oblong obtuse, superior margin and apex soriferous, sori distinct oblong subreniform, stipes subglabrous, rachis villous, caudex creeping.—*Gaudich. in Freyc. Voy. Bot. p.* 403.

Hab. Brazil; Rio Janeiro, *Gaudichaud*.—Said to form a sort of connecting link between *A. villosum* and *serrato-dentatum*, but having the sori free, numerous and subreniform, and consequently belonging to the polysorous group.

54. A. *Lancea*, Linn.; "fronds pinnate (bipinnate, *Sw.*) pinnæ (and pinnules *Sw.*) opposite oblong, terminal ones triangulari-hastate."—*Linn. Sp. Pl. p.* 1557, *Swartz, Syn. Fil. p.* 123. *Willd. Sp. Pl.* v. *p.* 440. *Sieb. Thes.* ii. *p.* 65, *t.* 64, *f.* 78.

Hab. Surinam (*Sieber*).—Linnæus seems to have taken this up wholly from Sieber's figure, and no modern author appears to be acquainted with it.

§ IV. *Frond pedately tripartite,** (*all polysorous*). (Sp. 55—65).

55. A. *pedatum*, L.; frond flabelliform bipartito-pedately divided tripinnate, secondary pinnæ lanceolate, pinnules membranaceous dimidiate oblong antrorsely subfalcate broadest at the superior truncated base very obtuse lowest ones triangular-cuneate all petiolulate, superior margin obtusely lobed, lobes soriferous, sori oblong rarely curved, stipes and rachis ebeneous glabrous.—*Linn. Sp. Pl.* 1557. *Sw. Syn. Fil.* 121. *Schkuhr, Crypt. t.* 115. *Willd. Sp. Pl.* v. *p.* 438. A. boreale, *Pr. Tent. Pterid. p.* 158.

Hab. North America, Virginia to Canada (Lake Huron), N. West America; California (*Douglas, Barclay*) to Sitka, *Barclay*. Unalaschka, *Chamisso*. Northern India, Kamoun, *Dr. Wallich*. Jumnotri, *Dr. Cantor*.—A very handsome species: the perfect frond is bipartite, each primary ramification spreads and is recurved, bearing on the upper side several secondary pinnæ, the ultimate one (or apex of each primary ramification) is forked. The specimens, from Northern India, are identical with those of the New World. The Unalaschka plant is referred confidently by Kaulfuss to *A. pedatum*, although Presl has named it as a distinct species. It is probably the same as the Sitka plant, and there can be no question of its identity with ours.

56. A. *tetragonum*, Schrad.; "caudex creeping, frond pedato-tripinnate, stipes tetragonous slightly furfuraceous, rachis pubescenti-paleate, tertiary pinnæ (or the pinnules) ovate much acuminate, superior base rounded inferior cuneate both margins subincised, lobes truncated soriferous the point naked (not soriferous) serrated, sori linear."—*Mart.*—*Schrad. in Goett. Gel. Arnz.* 1824, *p.* 872, *n.* 8. *Mart. Ic. Plant. Crypt. Braz. p.* 93, *t.* 63.

Hab. Brazil; Woods of Bahia, between Almada and Ferradas, *Martius*.—Martius has devoted a large quarto plate to a beautiful coloured representation of this fine species, which evidently belongs to the same group as the well known *Ad. pedatum*, and has a pedately tripinnate frond and large membranaceous pinnules: these pinnules are straight and much acuminate, the two margins nearly alike (little obliquity in the lower) and both are soriferous with long (sometimes a line in length) linear straight sori, very unlike any in the pedately divided group. No specimen has ever come under my observation, nor that of Mr. J. Smith; nor has any botanist noticed it, besides Schrader and Martius.

57. A. *curvatum*, Kaulf.; frond subflabellate pedately and dichotomously divided tripinnate, secondary pinnæ very

* The majority of the species of this group correspond well with this character. *A. Le Prieurii* is anomalous, from its reticulated or anastomosing venation: *A. affine* passes into the ordinary tripinnate or decompound form.

broad ovato-lanceolate acuminated, pinnules very shortly petiolulate (almost sessile) bright green rather firmly membranaceous dimidiato-oblong or lanceolate very obtuse or more or less acuminate deorsely falcate (rarely straight) broadest at the superior truncated base (but which is obtuse or rounded off), superior margin and apex serrated and slightly lobed, lobes soriferous, sori on the upper margin only linear or narrow-oblong straight angled, stipes on one side and the rachis moderately but distinctly pubescent. (TAB. LXXXIV. C.).—*Kaulf. En. Fil. p.* 202. *Link Fil. Hort. Reg. Berol. p.* 68.

Hab. Brazil (*Kaulfuss*). Dry woods, Sierra de Santa Brida, Prov. of Goyaz, Brazil, *Gardner*, 4074.—I have drawn my description mainly from dried specimens and living plants sent from the Botanic Garden of Berlin, with which Mr. Gardner's plant quite coincides. It is clearly a good species, that is, different from any other that has come under Mr. Smith's or my observation; but as I have already observed, *A. angustatum*, Kaulf. (also from Brazil), is probably a mere form of it; possibly, too, *A. humile*, Kze.; and, if any of the pinnules bear sori on the lower as well as the upper margin (which I have never found to be the case) it would appear almost identical with *A. tetragonum*, Schrad. and Martius, Ic. Pl. Crypt. t. 63.

58. A. *humile*, Kze.; "frond subpedate, branches 3—5-pinnate, pinnæ oblong dimidiate subfalcate superior base truncated, auricle obtuse dentated, lower base nearly straight, superior and exterior margin of the sterile ones sharply serrated, of the fertile ones crenated, sori oblong distinct, rachis and stipes short paleaceo-hispid."—*Kunze, in Linnæa*, ix. *p.* 80.

Hab. Woods of Huallaga, Province of the mission of Tocache, *Poeppig* (*Kunze*).—"Nearest to *A. curvatum*, Kaulf. Enum., which differs in the superior base of the pinnule being rounded, not auriculated, in the margin being inciso-dentate, the laciniæ soriferous. Scarcely a foot high; stipes nearly equal in length to the frond."—*Kze. l. c.*

59. A. *patens*, Willd.; frond flabelliform bipartito-pedately divided tripinnate, secondary pinnæ lanceolate obtuse straight, pinnules chartaceous (brown when dry) dimidiate-oblong very obtuse generally straight sometimes deorsely falcate, upper base truncate sterile ones crenato-lobate the sinuses (4—5 on a pinnule) soriferous, involucres reniform-orbicular large with a deep sinus at length coriaceous pale and submembranaceous at the margin, stipes and rachis ebeneous very glossy the latter pubescent.—*Willd. Sp. Pl.* v. *p.* 439. *Klotzsch, in Linnæa*, xviii. *p.* 556. (TAB. LXXXV. A.).

Hab. Caraccas, *Bredemeyer;* Cerro de Pinal, on the Pacific side and

Island of Salango, *Seemann.* Acapulco, *Dr. Sinclair.* Sta. Martha, *Funck, n.* 442.—For my finest specimens of this I am indebted to Captain Kellett, R. N., commanding H. M. Surveying ship "Herald," who much contributed to the success of the naturalist, Mr. Seemann, in a four years' cruize in the Pacific, during which, two voyages were made to the Arctic regions by Behring's Straits in search of the gallant Franklin and his officers and crew. The species was sent home by Mr. Seemann from the two localities above mentioned. In its regular pedato-flabellate ramifications it most resembles *A. pedatum;* but the whole plant is smaller, there are fewer branches, the form and texture of the pinnules are different, and the fructification is totally at variance with that of *A. pedatum.* The involucres are singularly large for the size of the pinnules, at length thick and coriaceous in the disk, but remarkably depressed there. In the ramification and form of the involucres the species exhibits the closest affinity with *A. pubescens;* where, however, besides the pubescent character of the pinnules, their shape is different, much more obtuse, and not glaucous beneath, and the involucres are much smaller and more numerous.

60. A. *Lindsæa,* Cav.; "frond pedate, branches pinnate, lower pinnæ rotundate, superior ones trapezoid, sori linear, stipes glabrous." *Willd. Sp. Pl.* v. *p.* 439. *Sw. Syn. Fil. p.* 121.

Hab. Quito (*Cavanilles*).—I have never seen any *Adiantum* from Quito, corresponding with this brief character, though the ferns of that region are tolerably familiar to me through the kindness of Professor Jameson. Nor does any author, since Cavanilles' time, speak of it from his own knowledge.

61. A. *angustatum,* Kaulf.; "frond pedate, branches pinnate, pinnæ linear-lanceolate, superior base truncate, inferior subdimidiate serrated at the apex, superior margin inciso-dentate, segments soriferous, stipes pubescent." *Kaulf. En. Fil. p.* 202.

Hab. Brazil, (*Kaulfuss*).—"Pinnæ thin (tenues) full green, lower ones half an inch long, deltoid, the rest an inch and a half long, 3 lines wide at the base."—This character and brief description accord with some of the states of our *A. curvatum* having narrow pinnules; and it is probably only a variety of that species.

62. A. *flabellulatum,* Linn.; frond flabellate bipartito-pedately divided tripinnate, secondary pinnæ lanceolate acuminated, pinnules glabrous subcoriaceo-chartaceous obliquely cuneate or semiorbicular-cuneate superior base truncate superior margin 2—4-lobed (and serrato-dentate in the sterile ones, lobes soriferous, involucres large the breadth of the lobe oblong straight rarely a little curved hard coriaceous), stipes (elongated) ebeneous scabrous below, the rest as well as the slender rachis glossy and glabrous.—*Linn. Sp. Pl. p.* 1558. *Sw. Syn. Fil. p.* 121. *Willd. Sp. Pl.* v. *p.*

440. A. fuscum, *Retz Obs.* ii. *p.* 28, *t.* 5. A. amœnum, *Wall. Cat. n.* 78. *Hook. et Grev. Ic. Fil. t.* 103. *Pluken. Alm. t.* 4, *f.* 3.

Hab. China, *Osbeck*, *Beechey*, *Oman*, *Vachel.* Nepal, Srinuggur and Kamoun, *Wallich.* Assam and Khasiya, Malacca, *Griffith.* Ceylon, *Gardner.* Java, *Lobb*, *Zollinger.*—The firmer texture, the short often quite cuneate and broad pinnules, but especially the elongated sori (resembling those of *A. obtusum*) readily distinguish this fern from all the pedate species. It is probably a native of all the warmer parts of India and China.

63. A. *hispidulum*, Sw.; frond narrow flabelliform bipartito-pedately divided tripinnate, secondary pinnæ linear-lanceolate acuminate falcate, pinnules chartaceous rigid close dimidiate oblong-cuneate olive brown when dry glaucous beneath striated pubescenti-hirsute especially beneath (often glabrous) subspinuloso-serrate, superior base truncate apex obtuse, sori copious small on the upper margin and reaching to the apex (on almost every pinnule) 7—11 on each pinnule in the sinus of the serratures, involucres orbicular-cordate hispid or glabrous convex, stipes triquetrous ebeneous scabrous, rachis ebeneous hispid or pubescenti-scabrous. *Sw. Syn. Fil. p.* 124 *and* 321. *Willd. Sp. Pl.* v. *p.* 444. *Br. Prodr. p.* 155. A. pubescens, *Schkr. Fil.* 108, *t.* 116, (a good general resemblance). *Willd. Sp. Pl.* v. *p.* 439. A. pedatum, *Forst. Prodr. p.* 83, *n.* 458, (*not Linn*). A. nervosum, *Sw. Syn. Fil. p.* 123. *Willd. Sp. Pl.* v. *p.* 443. A. plicatum, *Kaulf. En. Fil. p.* 201. A. scabrum, *Wall. Cat. n.* 79. A. flabellulatum, *Wall. Cat. n.* 2177, (*not Linn.*)

Hab. Society Islands, *Forster* (in Herb. nostr.), *Beechey*, *Barclay*, *Cuming*, n. 1415, *Mathews*, n. 11. Austro-Caledonia, *Labillardière.* New Holland, Port Jackson to the Tropics, *Brown*, *Fraser*, *Cunningham*, *Clowes*, *Mitchell*, n. 184 and 339, *Sieber*, *Sinclair.* Dunk Island, *Dr. Mc Gillivray.* New Zealand, *Fraser*, *All. Cunningham*, *Colenso*, *Sinclair*, *Hooker*, *Lyall.* Norfolk Island, *All. Cunningham*, *Dr. Falconer*, *Dr. Vaughan Thomson.* Ceylon, *Mrs. Genl. Walker*, *Gardner.* Bourbon, *Capt. Carmichael*, Herb. nostr. (ex Herb. Paris). Mauritius, *Telfair*, *Wallich*, *&c.* East Indies; Dindygul, elev. 1500—2000 feet, *Dr. Wight* in Wall. Cat. n. 2177. Neilgherries, *Gardner.* Java (*Hoffmansegg*, in Herb. nostr.) Amboyna, (in Herb. nostr.).—Few Ferns are better marked than the present, few less understood, and few more widely dispersed, judging from specimens in my own herbarium. I possess one marked "Chacapoyas, Peru;" but I do not venture to give the station without expressing my doubt if there be not some error.

(*Veins every where anastomosing.*)

64. A. (Hewardia) *Le Prieurii*, n. s.; frond subcordate

dichotomously radiating pedately tripinnate, pinnules approximate petiolulate unequally semiovate obtuse (sterile apices acuminate and slightly serrate) crenato-lobate membranaceous, veins anastomosing opaque olive-brown the base obliquely cuneate, sori linear-oblong on each lobe rarely on the lower margin. (TAB. LXXXII. B.)

Hab. Berbice, *Sir R. H. Schomburgk.* Moist declivities of the mountain Matouri, at Notaille and Oyapoch, French Guiana, *Le Prieur* (who sends it marked "*A. trapeziforme.*"—A most distinct and well defined species, having the mode of growth of *A. pedatum*, and almost equally membranaceous pinnæ. These pinnæ when dry assume a dark olive-brown colour. Each lobe is truncated and terminated with a transverse linear oblong sorus. The veining is very apparent, frequently anastomosing; so that this would be a *Hewardia* if that genus were tenable, and if the character were derived wholly from the venation.

(*Indistinctly pedate.*)

65. A. *affine*, Willd.; frond subpedately bi- more rarely tri-pinnate, pinnæ lanceolate acuminate slightly falcate lax, pinnules very membranaceous olive-brown (when dry) dimidiate broadly ovate-rhomboid obtuse cuneate at the base, superior base truncated sometimes retrorsely subfalcate glabrous except a few scattered slender stiff hairs or setulæ, superior margin and round the apex crenato-lobate, the deep sinuses soriferous, involucres rather small 7—8 on a pinnule orbicular-reniform or orbicular-crescent-shaped submembranaceous, stipes triquetrous and slender, rachis ebeneous glossy glabrous.—*Willd. Sp. Pl.* v. *p.* 448. *Endl. Prodr. Fl. Norf. p.* 14. *All. Cunn. Bot. Nov. Zeal. in Hook. Comp. Bot. Mag.* ii. *p.* 366. A. trapeziforme, *Forst. Prodr. p.* 83, *n.* 460. *Schkh. Fil. t.* 121, (*not Linn.*) A. setulosum, *J. Sm. in Bot. Mag. Comp.* 1846, *p.* 22.

Hab. New Zealand, *Forster*, *All. Cunningham*, *J. D. Hooker* (in damp woods, Bay of Islands). Norfolk Island, *Bauer*, and *Dr. Mc William*, (who introduced living plants to the Royal Gardens).—A delicate, flaccid species, not ill figured by Schkuhr, l. c., but by some blunder stated to be a native of Jamaica, in consequence, no doubt, of its having been named "*trapeziforme*," a known tropical American species. Mr. J. Smith detected one of its best characters, though a very minute one, and quite microscopic; "It differs" he says, l. c., "from *A. pubescens* (*A. hirsutulum*, Sw.) among other marks, in being furnished with twelve or more black bristle-like hairs (they might be called black aciculi) which are produced between the veins on the upper surface, towards the lower margin and apex of the pinnules, with a few on the underside." *A. fulvum*, Raoul, is a considerably larger and firmer and stouter plant, with much smaller pinnules of a totally different texture, deeper sinuses for the sori, and a very rough stipes and rachis.

§ IV. *Fronds tripinnate or decompound.*

(*Sori almost invariably short, equal or nearly so, rarely continuous or elongated, as in* A. speciosum *and* fumarioides.)

* *Trapeziforme*† *groupe.* (Sp. 66—72.)

66. A. *trapeziforme*, L.; glabrous, frond large supra-decompound, pinnules large chartaceo-membranaceous glaucous beneath all petiolate obliquely rhombeo-cordate acuminate lobed the apex (and often the sterile lobes) inciso-serrate upper base truncate, inferior base very oblique lobes soriferous, involucres oblong-reniform, stipes rachis and pedicels ebeneous intensely black. *Sw. Syn. Fil. p.* 29. *Willd. Sp. Pl.* v. *p.* 447. A. rhomboideum, *Schkh.* 114, *t.* 122, (*good*). A. pentadactylon, *Langsd. et Fisch. Ic. Fil. p.* 22, *t.* 25, (*excellent*). *Hook. et Grev. Ic. Fil. t.* 98. A. eminens, *Pr. Pterid. p.* 155, *and Reliq. Hœnk.* (*as* A. trapeziforme). A. Klotzchianum, *Pr. Tent. Pterid. p.* 158 ? A. formosissimum, *Klotzsch in Linnæa*, xviii. *p.* 556. *Sloane Jam.* i. *t.* 59, (*very good*).—*β.* pinnules smaller obtuse. *Plum. Fil. t.* 95.—*γ.* pinnules approximate suboblong obtuse.

Hab. West Indian Islands Jamaica, Cuba, *Linden, n.* 1859. Mexico, *Galeotti, n.* 6338 (pinnæ often longer and narrower). Central America, Pacific side, *Sreman.* Caraccas and Brazil, frequent.—*β.* Mexico, near Vera Cruz, *Linden, n.* 70. *γ.* Cordillera of Vera Cruz, Mexico, *Galeotti, n.* 6338. Cuba, *Poeppig* (*Kunze in Herb. nostr*). Guatemala, *Skinner.*—This fine species, from 2—4 feet high, has been much misunderstood, mainly owing to sufficient allowance not being made for those variations to which Ferns, in general, seem peculiarly liable. Our best authority for this particular species is the figures quoted by Linnæus. Among them is Sloane's Jamaica, t. 59, whose description seems to have suggested the specific name "A. nigrum ramosum maximum, foliis magnis *trapezii* in modum figuratis," and this figure Linnæus pronounces "bona." He further quotes Plumier, Fil. t. 95, which Willdenow undertakes to pronounce "mala;" but we will venture to say, that although it does not well exhibit the character of the normal form of *A. trapeziforme*, it does that of a commom state of the species. Willdenow, however, and properly, brings as a synonym to *A. trapeziforme* the *A. rhomboideum* of Schkuhr, t. 122; but that author, Schkuhr, excludes the figure of Plumier altogether. Humboldt and Kunth have an *A. rhomboideum*, which has nothing to do with Schkuhr's *rhomboideum*. This latter Dr. Klotzsch, in his notes on the Ferns of Æquinoctial America (Linnæa, xviii. p. 556) takes up, as an entirely new species, under the name of *formosissimum*, and places in a different section from his *A. Peruvianum*, l. c., p. 555, which is closely allied to the true *trapeziforme*.—The *A. trapeziforme* of Schkuhr, Tab. CXXI. b, said to be a native of Jamaica, is quoted by Willdenow as the *A. affine* of New Zealand, upon what authority is not stated, but it is very unlike any New

† This and the following groupes are merely noted as aids to the student: they pass into other forms and possess no decided marks.

Zealand Fern with which I am acquainted.—Var. *β.* I consider a less perfect form of *trapeziforme*, with smaller, rounder, more entire, and blunt pinnules.—Our *γ.* has the pinnules more approximate, more spreading, almost horizontal, the inferior oblique base cut off as it were by a much longer line, and hence the form of the pinnæ rather approaches to oblong; but intermediate gradations exist in our herbarium among some specimens; and upon these varieties themselves there are, here and there, cordately rhomboid pinnules. Our specimen of *A. trapeziforme* of Cuba, *Poeppig* (from Kunze), evidently belongs to this variety, which may, I think, be seen to pass into our next species, *A. cultratum*, chiefly differing by its blunt pinnules.

67. A. *cultratum*, J. Sm. mst.; frond ample decompound, pinnules chartaceo-membranaceous approximate petiolate (upper ones shortly so) spreading nearly horizontally oblong obliquely rhomboid very obtuse lobed and subincised upper base truncate and parellel with the rachis lower base elongated and arched (rarely straight) lobes soriferous, involucres oblong-reniform, stipes rachis and pedicels ebeneous intensely black. A. cultratum, (*an Pr. Tent. Pterid.? p.* 157). *J. Sm. Herb.*

Hab. St. Vincent, *Macrae*, in J. Sm. Herb. St. Catharine's, Brazil, *Armstrong*.—Were this and the normal form of *A. trapeziforme* only to be seen, few would hesitate in pronouncing them two good and distinct species. But with the large suite of specimens we have the good fortune to possess, a passage to this from *A. trapeziforme*, through Galeotti's n. 6338, and our var. *γ.* of the latter species to the present, may without much difficulty be traced; indeed it differs from the last-mentioned variety of *A. trapeziforme* in little else than the very obtuse pinnules. The narrow and oblong, and spreading and approximated pinnules give the peculiar feature; but in our *A. cultratum* some of the pinnules approach very nearly to cordato-rhomboid.

68. A. *subcordatum*, Sw.; fronds ample supradecompound, pinnules large chartaceo-membranaceous glaucous beneath all petiolate obliquely rhombeo-cordate acuminated slightly lobed the lobes equal approximate sometimes nearly entire sterile portions more or less inciso-serrate or entire upper base truncate lower very oblique angles obtuse, sori reniform copious approximate, stipes rachis and pedicels ebeneous intensely black. "*Sw.*" *Spreng. Syst. Veget.* iv. *p.* 114. A. betulinum, *Kaulf. En. Fil. p.* 207. A. truncatum, *Raddi, Fil. Brasil. p.* 59, *t.* 78, *f.* 1 (*pinnules less acuminated than in my specimens*). A. Klotzschianum, *Presl*, (*specimen from Dr. Klotzsch*).

Hab. Brazil, *Chamisso* and others. *Gardner*, *n.* 197 (A. pentadactylon. *not Langsd. and Fisch.*) and *n.* 5299, *A. subcordatum* (with pinnules rather more lobed and approaching to *A. trapeziforme*).—In deference to other botanists, rather than from my own conviction, I retain this as a species. I

think Mr. Gardner's n. 5299 may be considered just intermediate between *A. trapeziforme* and *A. subcordatum*.

69. A. *Peruvianum*, Kl.; fronds ample decompound, pinnules very large chartaceous slightly glaucous beneath all petiolate obliquely trapezoid obtuse (rarely acuminate) the angles rounded superior margin duplicato-crenate lobules soriferous, sori approximate reniform, stipes rachis and pedicels ebeneous intensely black. (TAB. LXXXI. C.) *Kl. in Linnæa*, xviii. *p.* 555. A. populifolium, *J. Sm. mst.*

Hab. Peru (Vitoc, *Herb. Ruiz and Pavon, Klotzsch*); *Mathews*, *n.* 1854. —This is, in every respect, a much stouter and more rigid plant than *A. trapeziforme* or *A. subcordatum*, with the pinnæ coriaceous, 2½ and 3 inches long, and almost exactly trapeziform, their two lower sides, however, more or less unequal, the upper sides or margins rather crenate than lobed, all the angles (except the point of insertion with the petiole) obtuse; though in some pinnules the apex is acuminated, and hence showing a great affinity with the two preceding. This species or form we only know as Peruvian, from Ruiz and Pavon and Mathews' collections.

70. A. *Mathewsianum*, Hook.; glabrous, frond large supradecompound, pinnæ lanceolate, pinnules approximate obliquely rhombeo-ovate rather long petiolate sub-acute rigid chartaceo-membranaceous glossy striated superior base truncate inferior base (or lower half of lower margin) straight and horizontal, the rest moderately lobed and serrated, lobes soriferous, involucres rather large hard broad semilunate, stipes and rachis everywhere ebeneous glossy glabrous. (TAB. LXXXIV. A.)

Hab. Chacapoyas, Peru, *Mathews*, *n.* 3296.—I have seen this fine species in no collection save from Mathews, and it appears to me to be very distinct, allied on the one hand to the groupe to which *A. trapeziforme* belongs, and on the other to *A. Brasiliense* and its allies. I prefer placing it here, on account of the very distinct petioles (1—2 lines long) of the pinnules. The texture of the frond is firm, rigid, chartaceous: the sori extend a considerable way beyond the apex on the lower margin (8—10 on each pinnule) and are large, firm and thick, occupying the sinus of a lobe, lunulate, but becoming broader beyond the base.

71. A. *sinuosum*, Gardn.; frond tripartite, branches pinnate, pinnules all petiolate large rhomboidly subcordate membranaceous the bases very unequal upper margin inciso-lobate, sterile lobes especially sinuate and emarginate, lobules soriferous, involucres in a rather deep sinus reniform, stipes rachis and petioles ebeneous dark-brown. A. sinuosum, *Gardn. Herb. Bras. n.* 3552, *and in Hook. Ic. Plant. tab.* 504.—β. smaller more membranaceous, pinnules less sinuated.

Hab. Dry rocky places, near the summit of the Sierra de Natividade, Province of Goyaz, Brazil, *Gardner.*—β. Cerro of Santana, Guayaquil, El Equador, *Professor W. Jameson.*—The present species seems to me very different from any previously described one, and to unite the *trapeziform* groupe with the *Capillus-Veneris* form. In no other individual of the present division is the involucre situated at the bottom of a deep sinus of a lobe; yet the size of the pinnules and general aspect of the plant induce me to place it here.

72. A. *amplum*, Pr.; "fronds subovate dilated below triabove bi-pinnate, pinnules petiolate alternate rhomboid rotundate or obtuse incised at the upper margin, incisures emarginate serrulate, involucres reniform, stipes and rachis very glabrous." *Presl, Reliq. Hœnk. p.* 63.

Hab. Mexico and Guayaquil, *Hœnke.*—"Frond 2 feet high, a foot and a half broad: pinnules 6 lines long, 5 broad." The author observes, "Affine *A. trapeziformi*, L. et præsertim *A. affini*, Willd.; à priore differt pinnulis minoribus rotundato-obtusis, incisuris emarginatis, soris lunatis, nec sublunatis, à posteriore pinnulis exacte rhombeis, incisuris denticulatis."—Now the *A. trapeziforme* of Linnæus is, as is well known, a species of very marked character: the *A. affine*, is, according to Willdenow, a New Zealand plant, and of which he observes "sequenti (*A. Capillo-Veneris?*) affinior, quam *A. trapeziformi*;" so that it becomes extremely puzzling to know where to place this.

** *Capillus-Veneris groupe.* (Sp. 73—93.)

73. A. *Capillus-Veneris*, L.; frond ovate tri-quadri-pinnate, pinnules delicate membranaceous glabrous obliquely broad-cuneate (sometimes approaching to rhomboid) tapering into a rather long slender petiolule, the superior margin deeply and irregularly inciso-lobate, lobes very obtuse or truncate soriferous (sterile ones subinciso-dentate), sori as broad as the lobe oblong or subreniform, stipes and slender rachis everywhere ebeneous glossy and quite glabrous. *Linn. Sp. Pl. p.* 1558. *Sw. Syn. Fil. p.* 124. *Jacq. Misc.* ii. *p.* 77, *t.* 7. *Willd. Sp. Pl.* v. *p.* 449. *Sm. E. Bot. t.* 1564. A. Moritzianum, *Klotzsch.* A. dependens, *Chapman's mst.* (*ex Torrey*).—β. pinnis profunde incisis. (Tab. LXXIV. B., young frond). A. tenerum, var. dissectum, *Mart. and Galeot. Fil. Mex. p.* 71.

Hab. Throughout the temperate and warm parts of Europe: in Britain confined to the West of England, Wales and Ireland (said to have been found in Scotland): in the South of France growing in the greatest profusion, and luxuriating in the moist, perpendicular sides of the wells. North of Africa, and African Islands of the Mediterranean. Throughout the East Indies, but chiefly in damp hilly districts, Malabar, Nepal, Kamaoun, &c., *Wallich*, Cat. (n. 73) and *Wight* (n. 133), *Edgeworth* and others. Assam, Khasiya, Boutan, *Griffith.* Scinde, *Dr. Stocks.* Mauritius, Bourbon, Ma-

dagascar (*Bojer*). China, *Fortune*. South Africa, Algoa Bay, Uitenhage. Sandwich Islands, *Menzies*. Throughout the temperate parts of North America, east and west side. Guatemala (with var. β.), *Skinner*. Mexico (var. β.), *Galeotti*, n. 6361. Trinidad, *Lockhart*. Dominica, *Dr. Imray*. Jamaica, *Dr. Wright*.—A very universally diffused and well-marked species, varying, however, like many other Ferns, in the general outline and the more or less deeply cut pinnules.

74. A. *Æthiopicum*, Linn.; frond oblong-ovate triquadripinnate, pinnules sub- or quite membranaceous glabrous suborbicular suddenly and obliquely cuneate at the base into a rather and very slender petiolule, superior margin more or less lobed, lobes shallow emarginate, the sinus or notch of the lobe soriferous, sori rather large 2—6 on a pinnule, involucres oblong-lunulate, stipes and slender rachis everywhere ebeneous shining and glabrous. (Tab. LXXVII. A.) *Linn. Sp. Pl. p.* 1560. *Willd. Sp. Pl.* v. *p.* 452. *Swartz, Syn. Fil. p.* 125. *Pluk. Alm.* x. *t.* 253, *f.* 2 (*bad*). A. thalictroides, *Willd. Herb. in Schimp. Herb. Abyss. n.* 19, (*involucres white*). A. pellucidum, *Mart. et Galeot. Fil. Mex. p.* 272, *t.* 19.

Hab. South Africa, frequent. Tristan d'Acunha, *Carmichael*. Madagascar, *Dr. Lyall*. Abyssinia (exactly resembling in colour and rather firm texture the *A. assimile* of Australia). Neilgherries (*Sir F. Adam*). South America, not unfrequent; Quito, *Jameson*, n. 56 and 209 (pinnules of a firmer texture). Peru, *Mathews*, n. 3295. Guatemala (*Skinner*) and Mexico, *Galeotti*, n. 6562; *Hartweg*, n. 1624. Caracas, *Linden*, n. 84. Brazil, *Sellow*, *Hinds*, *Boog*. Mendoza, *Gillies*.—Evidently allied to small-pinnuled specimens of *A. Capillus-Veneris*, but truly and constantly distinct; firstly, in the more orbicular and less sharply and gradually attenuated base of the pinnules, and secondly, in the fructification, the sori here being placed in the sinus of a notch in the lobe, and the involucres quite broad, lunate or reniform (not occupying the whole apex of a lobe). It is true the Cape of Good Hope is the only station assigned for this plant by Willdenow; but I cannot myself see how the ferns I have here adduced from other localities, both of the Old and New World, can be distinguished from it; and in order that others may judge of one from a S. American locality, I give a figure of that, considering it to be true *Æthiopicum*, from Guatemala.

75. A. *assimile*, Sw.; "fronds supradecompound quite glabrous, pinnules rhombeo-subrotund inciso-crenulate in the anterior margin, sinuses narrowed and soriferous, involucres reniform, rachis and stipes very smooth." *Br.—Sw. Syn. Fil. p.* 125 *and* 322, *t.* 3, *f.* 4. *Willd. Sp. Pl.* v. *p.* 453. *Br. Prodr. Fl. Nov. Holl. p.* 155. A. trigonum, *Labill. Nov. Holl.* ii. *p.* 99, *t.* 248, *f.* 2. *Willd. Sp. Pl.* v. *p.* 453.

Hab. Van Diemen's Land, *Labillardière*, *Gunn*, *J. D. Hooker* and others. New South Wales. Port Jackson, *Brown* and others. Encounter

Bay, *Whitaker*. Subtropical New Holland, interior, *Major Mitchell*, *n.* 340 and *n.* 183. Swan River, *Drummond*. E. Coast, tropics, *All. Cunningham* (pinnules a little larger than usual). New Zealand, Northern Island, *Colenso*, *Dr. Sinclair*, *J. D. Hooker*, &c.—I retain this *Adiantum* as a species with much hesitation, and out of respect to others; for I do not myself see how it can be distinguished from some of the common forms of *A. Æthiopicum*, a very widely dispersed fern, as I have already shown, both in the Old and in the New World, and therefore not unlikely to exist in Australia and New Zealand. Our copious specimens are generally of a brighter green and of a firmer texture than is usual in the dried specimens of that species; but the prevailing form of the pinnules and the position and shape of the involucres are alike in both; so that, had no *A. assimile* been published, I should without hesitation have referred the Australian plant to *Æthiopicum*. Swartz, with whom the species originated, only alludes to its affinity with *A. fragile* "sed laxius, stipite longiore, fronde minus divisa et pinnulis minime basi cuneatis." His figure, it will be seen, is a good representation of *A. Æthiopicum*. Labillardiere's description and figure of *A. trigonum*, l. c., equally well accord with *A. Æthiopicum*, and *that* Mr. Brown has rightly referred to Swartz's *assimile;* while of this *A. trigonum* Willdenow observes, "valde simile *A. Æthiopico*, sed characteribus indicatis diversum:" yet in his specific character there is nothing whatever to distinguish it,—"frondibus triplicato-pinnatis, pinnulis subrotundo-rhombeis obtuse trilobis apice crenatis, indusiis lunatis, stipite trigono." Were I myself to frame a character it would be verbatim that of *Æthiopicum*.

76. A. *pulchellum*, Bl.; "fronds divaricated triplicato-pinnate membranaceous glabrous, pinnules petiolate trapezoid obtuse crenulated at the upper margin, lowest ones obovato-rotundate, involucres reniform glabrous, stipes semiterate shining black-purple." *Bl. En. Pl. Jav. Fil. p.* 216.

Hab. Woods, interior of Java, *Blume*.—"Maxime simile *Adianto Æthiopico*, L., cui differt forma pinnularum." *Bl.*

77. A. *fumarioides*, Willd.; "fronds triplicato-pinnate, pinnules subrotundo-rhomboid obtuse undivided crenated at the apex, fructiferous ones entire terminated with the linear continuous sorus." *Willd. Sp. Pl.* v. *p.* 452.

Hab. Bourbon, *Flügge* (Willd.). Near A. *Æthiopicum*, but different in the small size and the linear continuous sori.

78. A. *digitatum*, Pr.; frond tripinnate, primary and secondary pinnæ ovate, pinnules membranaceous all on long petiolules cordate truncated or with a shallow sinus at the base pubescenti-hirsute nearly equilateral very patent deeply trifid almost tripartite, lobes cuneate incised and lobed, elongated stipes and rachis, of which the ultimate divisions are pubescent ebeneous and glossy, sori — ? *Presl, Tent. Pterid. p.* 159, *name only.* (*Klotzsch, in Herb. Hook.*) "Lygodium *Herb. Bras. Reg. Ber. n.* 152."

Hab. Brazil, *Sellow* (*Klotzsch in Herb. nostr.*)—The specimen I am favoured with of this remarkable plant, consists of a stipes about a foot long, bearing the base of a frond about 5 inches in length, showing a ramification similar to that of *A. Capillus-Veneris*, but with longer petiolules standing out at right angles from the secondary or tertiary rachis, the pinnules about as large as in the species just mentioned, but of a totally different shape, almost resembling the leaves of *Geranium dissectum*, and nearly, if not quite, equilateral, and so unlike those of any *Adiantum* that it will be seen that Willdenow had considered it a *Lygodium*. In the absence of fructification I can give no opinion of the true genus; and as neither Presl nor Klotzsch has, as far as I know, given anything but the name of this plant, I cannot say if they had the means of determining accurately the proper genus.

79. A. *emarginatum*, Bory; "fronds bi- (tri-) pinnate, pinnules obcordato-cuneate, sterile ones serrulated at the apex, sori oblong." *Willd.—Bory in Willd. Sp. Pl.* v. *p.* 449. —*β.* pinnules larger. (TAB. LXXV. A.)

Hab. Rocky places by torrents in the Isle of Bourbon, *Bory. Néraud*, in Herb. Hook., ex Herb. *Delessert.*—*β.* Madras Peninsula, *Dr. Wight*, Herb. nostr. n. 135. Malacca, *Griffith.*—From Bourbon I possess a specimen under this name, given me, with many other fine things, by the late lamented M. Benj. De Lessert, and which sufficiently accords with Willdenow's brief character and remarks. It has quite the habit of rather large-pinnuled specimens of *A. Æthiopicum*, but with sori resembling both as to position and form those of *A. Capillus-Veneris;* hence the just remark of Willdenow "valde simile præcedenti sed statura constanter minor, pinnulæ nunquam lobatæ semper obcordatæ." Dr. Wight's specimen, l. c., quite accords with the Bourbon plant; except that the pinnules are again rather larger (all bearing fructification). Mr. Griffith's specimen from Malacca precisely agrees with Dr. Wight's *Adiantum*, and being only partially fertile the serrulated apices are very apparent. But in all these I see nothing to distinguish them from the South American *A. Chilense*. The specific name is very incorrect; for Willdenow says "pinnulæ apici profunde emarginatæ majores obcordatæ, lobis quandoque *leviter* emarginatis." We need not tell any one accustomed to study ferns, how variable is the lobing of the pinnæ and pinnules on one and the same specimen.

80. A. *cuneatum*, Langsd. and Fisch.; frond rather small ovate or oblong-ovate triquadripinnate, pinnules membranaceous glabrous on rather long slender petiolules cuneate (more or less broadly) superior margin rounded conspicuously 2—4-lobed, lobes obtuse deeply emarginate or bifid, their segments falcately incurved connivent, sinus or narrow deep cleft of each lobe soriferous, sori rather large, involucres orbicular-cordate membranaceous, stipes and slender rachis everywhere ebeneous glossy glabrous. *Langsd. and Fisch. Ic. Fil. Brasil. p.* 23, *t.* 26 (*good*). *Willd. Sp. Pl.* v. *p.* 450. *Raddi, Fil. Brasil. t.* 78, *f.* 2. *Hook. and Grev. Ic. Fil. Rar. Tab.* 30.

Hab. Brazil, St. Catharine's, *Chamisso*, *Raddi* (in Herb. nostr.) and others. Organ Mountains, near Rio, *Gardner*, *n.* 196. South Brazil, *Sellow*, *Tweedie*. Uraguay, *J. Baird*.—Certainly allied to *A. Æthiopicum*, but the pinnules are invariably cuneated and the lobes deep (so that the sori are placed higher up on the lobes than the base of the sinuses of the lobes), and the two segments of the soriferous lobes are always so narrow and so incurved as to conceal the fissure, well represented in the Ic. Fil. Rar. It is rather a small species; the largest specimen I have is 12—14 inches long: the more usual size is as given in Langsdorff and Fischer, and in the Ic. Fil. above quoted. I have seen the true form of this plant only from Brazil; and it is very constant to its characters. The name has been applied to *Adianta* of other countries, which have appeared to me different.

81. A. *glaucophyllum*, Hook.; tall frond ovate supradecompoundly pinnated, pinnules rigid chartaceous glabrous glaucous on both sides on rather long slender petioles cuneate (generally narrowly so) superior margin rounded 2—4-lobed, lobes obtuse emarginate or bifid their segments falcately incurved connivent, sinus or cleft of each lobe soriferous, sori rather small, involucres orbicular-cordate subcoriaceous when old, stipes and slender rachis everywhere ebenous glossy glabrous. A. cuneatum, var. angustifolium; *Mart. and Galeot. Fil. Mex. p.* 70.

Hab. Cordillera of Mexico, inhabiting the cold region, at an elevation of 9000 to 10,500 feet above the level of the sea, *Galeotti*, n. 6266, and 6359 (the latter with narrower and more rigid almost coriaceous pinnules), and n. 6566; Pic d'Orizaba, 9750 feet; *Linden*, *n.* 48; *Jurgensen*, *n.* 322; *Mr. Parkinson*. "Teapisca (Chiapas)," *Linden*, *n.* 1550. Veraguas, Central America, *Seemann*.—M M. Martens and Galeotti referred their two *Adianta* from Mexico, n. 6226, and n. 6359 to the *A. cuneatum* of Langsdorff and Fischer, as narrow pinnuled varieties; and I was disposed to do the same, until I observed that my Mexican specimens, from seven different localities as far as I can judge, all agreed in being of a larger size and more compound than that species, with narrower, more rigid, and always glaucous pinnules, together with a less deep and narrow notch for the reception of the sori; and not only do they thus accord in the respective characters, but I have not seen anything to correspond with them anywhere but from Mexico and adjacent regions; certainly no such appearances are exhibited by any of the true Brazilian *A. cuneatum*. I think it will prove a good species (nearest, perhaps, to the *A. venustum*, Don, of the East Indies), which like many other ferns, is very difficult to be defined by words: the eye readily distinguishes it.

82. A. *venustum*, Don; rather small ovate tripinnate, pinnules firm membranaceo-chartaceous glabrous and slightly glaucous beneath shortly petiolulate obovato-cuneate rarely subrhombeo-acuminate striated the superior margin rounded scarcely ever or but slightly 2 or 3-lobed finely dentato-serrate, fertile lobes with 2 rarely 3 notches each notch bearing

a rather large sorus at the bottom, involucres reniform-cordate submembranaceous, stipes and slender rachis everywhere ebeneous glossy glabrous. (TAB. LXXVI. B.) A. venustum, *Don, Prodr. Fl. Nep. p.* 16. *Wall. Cat. n.* 81.

Hab. Northern India. Nepal, *Hamilton;* and at Srenuggur, Kamroop, *Wallich.* Simla, *Lady Dalhousie, Edgeworth.* Mussourie, *Dr. Bacon,* (*Herb. T. Thomson, n.* 612). Meerut, *Dr. T. Thom. i, Herb. n.* 118. Khasiya, elevation 6,500 feet, and Affghanistan, *Griffith.*—This I consider a distinct and well-marked species, approaching *A. cuneatum* and *glaucophyllum;* but with less divided (almost entire, except the serratures) pinnules; while the constantly few sori with their peculiar insertion, the colour (always pale greenish-brown when dry), the texture (rather papyraceous than chartaceous, yet firm), the copious, though minutes erratures, where there are no sori, and general aspect, readily distinguish it. All my several specimens are very uniform, and are quite peculiar to the mountain country in the north of India.

83. A. *fragile*, Sw.; fronds tufted ovato-lanceolate tri-quadripinnate, pinnules on short very slender petiolules thin membranaceous obovato-cuneate rounded at the apex and serrated in the sterile, 3 or 4-lobed in the fertile ones, very deciduous (on being dried), fertile lobes retuse bearing a sorus in the sinus, involucres oblong straight, stipes very short (sometimes scarcely any) and as well as the rachis everywhere glabrous ebeneous and glossy, root of tufted wiry fibres clothed with ferruginous wool. *Sw. Fl. Ind. Occ.* iii. *p.* 1721. *Syn. Fil.* 125. *Willd. Sp. Pl.* v. *p.* 451. A. cuneatum, *Kze. Pl. Exsicc. Poepp. (in Herb. nostr., an Linnæa*, ix. *p.* 82 ?)

Hab. Calcareous rocks, *Jamaica, Swartz, Dr. Wright, Poeppig, Otto, Wilson, Purdie.*—I have received specimens of Jamaica from five different persons of this singular plant, all exhibiting the same unfortunate character of shedding every leaflet in the act of drying: so that the specimens have come home showing the tufted root above described, a perfect skeleton of wiry stipites (growing in tufts) with the exceedingly slender and equally wiry rachis very much branched, and the pinnules all lying apart from the plant. Not a specimen is fit for the herbarium, nor fit for making a drawing. There are ample characters however, for recognizing the species. I know no *Adiantum* with so peculiar a growth, so tufted, so very short in the stipes, and with such deciduous pinnules, In other respects, these latter, a good deal resemble *A. cuneatum* of Brazil, and *A. venustum* of northern India.

84. A. *excisum*, Kze.; small (a span to a foot high), fronds densely tufted oblong or broad-lanceolate bi-tripinnate, pinnules very small on short petiolules thin flaccid membranaceous blackish-green flabellate 2—3-lobed (never serrated) few-nerved, lobes bifid bearing a sorus at the bottom of the sinus, involucres reniform large (for the size of the pinnule)

thin and membranaceous, stipes in general short and scaly (scales deciduous) and as well as the very slender filiform rachis flaccid brown shining glabrous or slightly squamose, root fibrous. A. excisum, *Kunze in Linnæa, p.* 82. *Analect. Pterid. p.* 33, *t.* 21.

Hab. Chili, *Poeppig.* Valparaisó, *Macrae, Cuming, n.* 492, *Bridges, n.* 550.—I do not find that this remarkable species is taken up by any author except Kunze; though it has been long in our herbaria. From a dense fibrous root, the fibres wiry and clothed with rusty wool, arises a tuft of fronds from a span to a foot at most in height including the usually short stipes, and this stipes is partially scaly; scales large, distant, lanceolate, membranaceous, deciduous: the whole plant singularly weak and flaccid, pellucid, but of a blackish green colour. The longest pinnules are scarcely more than two lines long, flabelliform, with the nerves very few and distant, so that never more than two communicate with the involucre: involucres generally 2 or 3 on each pinnule, rarely 4. The texture of the frond is more like that of *Cystopteris fragilis* than any *Adiantum.* It has no resemblance to any other species of the genus: and has the smallest pinnules of any with which I am acquainted.

85. A. *concinnum*, H. B. K.; frond large 1—2 feet long tripinnate, pinnules all petiolulate membranaceous glabrous rhomboid or rhombeo-obovate more or less obliquely cuneate at the base inciso-lobate (rarely entire or obscurely lobed and serrated), lobes obtuse mostly entire emarginate with the lobules or segments connivent soriferous in the sinus, lowest pinnules of each primary and secondary pinna erect and appressed to the rachis (!), sori 8—10 on a pinnule reniform, stipes rather short, main rachis rather stout straight partial ones slender, both stipes and rachis everywhere ebeneous glossy glabrous. *H. B. K. Nov. Gen. et Sp. Am.* i. *p.* 17, *and* 7, *t.* 668. *Willd. Sp. Pl.* v. *p.* 451. A. tenerum, *Schkuhr, Fil. t.* 121, (*exl. the syn.*) A. affine, *Mart. and Galeotti. Fil. Mex. p.* 70 (*not Willd.*) A. cuneatum, *Hook. fil. Pl. Galapag. Linn. Trans.* xx. *p.* 168.—*β.* pinnules entire or nearly so.

Hab. Caraccas, *H. B. K., Moritz.* Central America and Guayaquil, *Cuming, n.* 1154, *Skinner, Barclay, Seemann.* Chacapoyas, Peru, *Mathews, n.* 1850. Gallipagos, *Dr. Scouler.* Mexico, *Galeotti, n.* 6318 *and* 6436, *Linden, n.* 181, *Jurgensen.* Jamaica, *Mr. Fadyen, Wilson, Purdie.* St. Vincent, *L. Guilding.*—*β.* Andes of Quito, *Prof. Jameson, n.* 16.—No species can be more easily recognized than this, by a peculiarity faithfully represented in Humboldt's figure, less satisfactorily in Schkuhr's, and clearly noticed by Willdenow, who ought to have introduced it into his vague specific character: "Dignoscitur," he says, "facile pinnulis inferioribus pinnarum primarium et secundarium rachi stipulæ instar adpressis, quæ tamen ut omnes reliquæ petiolatæ sunt." Prof. Jameson's entire-pin-

nuled variety, as I have considered it, has at first sight a very different appearance, but some of my Guatemala specimens exhibit intermediate grades of pinnule. Mathews, n. 1850, is more lax and has more deeply cut pinnules than usual.

86. A. *scabrum*, Kaulf.; "fronds bi- or tripinnate, pinnules orbicular reniform denticulate hairy and albo-farinose beneath, stipes paleaceo-scabrous, rachis very scabrous, sori subcontinuous." *Kaulf. En. Fil. p.* 207. *Hook. and Arn. Bot. of Beech. Voy. p.* 53.

Hab. Chili, *Chamisso;* Conception, *Capt. Beechey, R. N.*—I have only seen one specimen corresponding with Kaulfuss' description; that is from Capt. Beechey's voyage, and without fructification. I dare not venture an opinion on such. The pinnules in shape resemble the more entire form of those of *A. Chilense;* the farinaceous substance resembles that of *A. sulphureum*, but is white. The name is scarcely appropriate, being only applicable, and not in a marked degree, to the stipes and rachis.

87. A. *Chilense*, Kaulf.; frond ovato-deltoid (a span to a foot long) tripinnate, pinnules all petiolulate coriaceo-membranaceous glabrous or hirsute subrhombeo-reniform more or less obliquely cuneate at the base often truncated there, the margin irregularly lobed and the sterile ones dentato-serrate, lobes or lobules retuse (with a broad shallow sinus) soriferous, involucres oblong-reniform coriaceous distant in the more lobed pinnules, crowded in those that are nearly entire, stipes and rachis everywhere ebeneous glossy and quite glabrous. A. Chilense, *Kaulf. En. Fil. p.* 207. *Kunze, in Linnæa*, ix. *p.* 83.—*β. hirsutum, Hook.* (TAB. NOSTR. LXXV. B.) *Hook. et Grev. Ic. Fil. t.* 173. *Kze. l. c. p.* 83. A. scabrum, *Kze. l. c. p.* 84? *Plant. Poepp. exsicc. (in Herb. nostr.)*

Hab. *α.* and *β.* Chili, Conception to Valparaiso, *Chamisso, Capt. King, R. N., Beechey, Macrae.* Juan Fernandez, *Bertero. β.* has been found by *Mr. Nuttall*, at Monterey, in California, *(Herb. nostr.)*.—The hirsute var. of this plant (and there are all gradations of hairiness) seems to have been generally taken for Kaulfuss' *A. scabrum:* but he expressly says of the leaflets of that plant "foliola subtus albo-farinosa." Poeppig's *A. scabrum*, from Chili, is simply a hairy state of this. My friend Nuttall's *A. dilatatum*, mst., from Monterey, Upper California, is identical with this var. Prof. Kunze refers to this species the *A. lobatum*, Presl, Reliq. Hænk., i. p. 62, t. 10, f. 4 (v. supra, p. 10), but he only judges from the figure and description: that species is said to be bipinnate and to inhabit Mexico; it may, however, be the same as *A. Chilense*, and probably was from Chili; for the station given of Hænke's plants are little to be depended upon.

88. A. *sulphureum*, Kaulf.; small tufted; frond ovate tripinnate, pinnules membranaceous all petiolulate small obovato-reniform obliquely cuneate lobed glabrous dark green

above pale and clothed with yellow pulverulent substance beneath, lobes more or less deeply emarginate soriferous in the notch, sori reniform or oblong subreniform copious contiguous, stipes and rachis ebeneous glossy glabrous.—*α. minus;* fronds four or five inches long, pinnules small, sori reniform. (TAB. NOSTR. LXXVI. A. two lower right hand figures). A. sulphureum, *Kaulf, En. Fil. p.* 207. *Kunze in Linnæa,* ix. *p.* 84.—*β. majus,* one foot high, pinnules larger, sori oblong reniform (TAB. NOSTR. LXXVI. A. the upper and lower left hand figures). *Kunze, Analect. Pterid. p.* 34, *t.* 22. *f.* 1, *a.* (A. sulphureum, sterile.)

Hab. Chili, *Chamisso, Poeppig, Bertero.* Conception, *Cuming, n.* 151.—*β.* Cordilliera of Peru, various places, *Mathews, n.* 1250.—The affinity of this is doubtless with *A. Chilense,* especially what I have here called the variety *majus,* and which, judging from its locality and from its much larger size, I am almost disposed to distinguish, under the name of *A. Peruvianum,* both from *A. Chilense* and from *A. sulphureum.* From the former it may be known by its larger size, in every respect, more distant pinnules on longer petioles, paler colour of the pulverulent substance, scarcely emarginate or retuse lobes and straighter sori; from *A. Chilense* by the membranaceous pinnules and the presence of the sulphur-coloured pulverulent substance. Kunze's figure, Analect. Pterid, l. c., t. 22, f. 1, a., seems to be identical with my var. *β.* as far as I can judge from the figure: but it is sterile.

89. A. *sessilifolium,* Hook.; frond ovate acuminate (8—10 inches) bi- (tri- ?) pinnate, pinnules sessile (or only the lowermost ones subpetiolulate) chartaceous glossy olive-green with scattered hairs on both sides subreniformi-obovate very obliquely cuneate, upper base truncate the margin much but not deeply lobed, lobes rather deeply emarginate the sinus of the notch soriferous, sori copious large contiguous, involucres lunulate (reniform but much curved) pubescent convex dark brown, stipes subscabrous and as well as the rachis castaneous glossy pubescenti-villous. (TAB. LXXXV. B.)

Hab. Chacapoyas, Peru, *Mathews, n.* 1855.—I place this near *A. Chilense,* as its nearest affinity, although my only two specimens are bi- not tripinnate; for it a good deal resembles it: but the pinnules are differently shaped, the sori also, and one of the striking marks of this plant is the sessile pinnules, or with the lowermost one on each pinna with a very indistinct and hairy petiolule.

90. A. *parvulum,* Hook. fil.; "quite glabrous, frond very thin tripartite, branches pinnate, pinnæ patent shortly petiolate subrhombeo-oblong, the apices rounded the inferior margin straight superior one denticulate emarginate at the sori, the base truncated, stipes glabrous, rachis scarcely

pilose." . *Hook. fil. Pl. of Galapag. in Linn. Trans.* xx. *p.* 168.

Hab. Charles Island, Galapagos, *Chas. Darwin, Esq.*—"A small species, most nearly allied to one that is a native of New Zealand, in which the upper margins of the pinnæ are crenate." *Hook. Fil.*

91. A. *Henslovianum*, Hook. fil.; "fronds bi- or rarely tripinnate elongato-ovate, primary pinnæ attenuated, secundary few, pinnules lax divaricated shortly petiolate rhombeo-lunulate membranaceous above crenately lobate, sori in the bottom of the lobes rather large, rachis puberulous stipes rufo-brunneous." *Hook. fil. l. c. p.* 169.

Hab. James and Charles Islands, Galapagos, *C. Darwin, Esq.*—As the affinities of this and the preceding species are not alluded to, and since I do not possess specimens, the place of them in the genus is doubtful to me.

92. A. *speciosum*, Hook.; large, frond ovate acuminate (3 feet long) tripinnate, pinnules chartaceous glabrous petiolulate cordate deltoid or subrhomboid with a rather unequal base lobato-pinnatifid, lobes cuneate truncated all soriferous at the apex, sori linear as long as the lobe, stipes very stout dull ebeneous subscabrous, rachis glossy pubescent on the upper side. (Tab. LXXXV. C.)

Hab. About the village of Sasaranga, El Equador, Pacific side, *Seemann, n.* 953, Aug. 1847. Peru, *Mr. Mc Lean.*—This is one of the finest and best marked species with which I am acquainted, and has really pinnatifid pinnules. It is true that this pinnatifid character in the younger leaflets is an indication that as the growth advances they will break up into other pinnæ: but the ultimate pinnules (and I have seen only tripinnated specimens) in the most perfect form are equally pinnatifid. These pinnules are commonly an inch and more long, all the lobes cuneate and truncated, and every lobe is terminated by a transverse, linear, rather narrow involucre occupying its whole breadth. The stipes is nearly 2 lines wide, but I do not possess the lower portion.

93. A. *tenerum*, Sw.; frond rather large (1½—2 and even 3 feet) 3—4-pinnate, pinnules all petiolate submembranaceous glaucous-green (very deciduous when dry) rhomboid the cuneate base very unequal the margins irregularly lobed (the sterile ones deeply so and laciniated) lobes and lobules retuse soriferous, sori rather numerous approximate, involucres short oblong-reniform, stipes and rachis ebeneous glossy everywhere quite glabrous. *Sw. Fl. Ind. Occ.* iii. *p.* 1719. *Syn. Fil. p.* 125. *Willd. Sp. Pl.* v. *p.* 450 (*not Schkuhr*). *Pluken. Alm. t.* 254, *f. l.* (*very characteristic but too small*).—*β.* pinnules shorter more approaching to orbicular, fertile ones

nearly entire, sterile ones crenato-lobate.—γ. pinnules larger more firm subchartaceous slightly lobed glaucous green.

Hab. West Indian Islands, probably general. Jamaica, *Swartz, Mc Fadyen, Wilson, Bancroft, Distin, Mc Nab, Purdie.* Cuba, *Poeppig (Kze. in Herb. nostr.)* Otto, (*Klotsch. in Herb. nostr. n.* 233). Guadeloupe, *L'Hermonier,* (*Herb. nostr. ex. Herb. Paris*). St. Vincent, *L. Guilding.* Bahamas, *Swainson.* Antigua, *Dr. Nicholson.* Central America, *Seemann.*—β. Acapulco and Realego, *Dr. Sinclair.*—γ. Veraguas, *Seemann.*—Pinnules generally about three quarters of an inch long. Although the term "*rhomboid*" aptly expresses the general form of these pinnules, yet many of them, especially the uppermost and the sterile ones, depart from this form, as is common to other *Adianta:* the lobing too is more or less deep, and the plant varies much in size. Some of our smallest specimens approach our larger forms of *A. fragile;* and, as in that species, the pinnules are, when dry, extremely caducous. Swartz compares it with *A. Capillus Veneris* and *A. trapeziforme*, and some states do exhibit pinnules of such a form as to justify such an opinion. Others again border on the more lax state of *A. concinnum.*—Var. β. has shorter and rounder pinnules, our var. γ. larger and more chartaceous ones.

* * * *Cristatum group.*† (Sp. 94—108).

94. A. *cristatum* L.; frond subtriangular-ovate bi-subtripinnate secondary pinnæ subapproximate lanceolate caudately acuminate terminal one elongated lowest pair generally bipartite, pinnules close-placed horizontally patent rigid-chartaceous dark olive brown striately veined when dry obliquely oblong-ovate acute generally antrorsely subfalcate, superior base truncate inferior cuneate glabrous gradually smaller upwards, terminal one elongated very narrow, sterile ones coarsely serrato-dentate, sori semioval or more rarely oblong chiefly confined to the superior margin (if extended round the point the apex becomes very obtuse) rachis fusco-pubescent, stipes dull black minutely muricato-scabrous. *Linn. Sp. Pl. p.* 1558. (*excl. syn. Sloane Jam. p.* 55, *f.* 1). *Willd. Sp. Pl. p.* v. 1558. *Sw. Syn. Fil. p.* 123? (*certainly excl. Plum. Fil. t.* 96). A. striatum, *Sw. Fl. Ind. Occ. p.* 1717. *Syn. Fil. p.* 124. *Jacq. Coll.* 3, *p.* 245. *Ic. Rar. t.* 646. *Kze. in Pl. Poep. exsicc. in Herb. nostr. Plum. Fil. t.* 67?

Hab. Jamaica, most abundant. Caraccas, *Jacquin.* Cuba, *Poeppig (Kze. in Herb. nostr.)* A harsh-feeling and stiff-growing plant and easily recognized, especially by the tapering pinnæ, the sharp pointed pinnules,

† Species having more or less affinity with the well-known *A. cristatum* of the West Indies; but which, as a group, cannot well be defined in words.

unless when the fructifications extend round the apex, and the rough and even muricated stipes. Jacquin's figure represents the habit of small specimens very well, but not the pinnules, which are too short and too blunt.

95. A. *microphyllum*, Kaulf.; frond subtriangular ovate bi-subtripinnate, secondary pinnæ subapproximate narrow-lanceolate much acuminate terminal one elongated lowest pair generally bipartite, pinnules close-placed horizontally patent chartaceous brown or dark green obliquely oblong-ovate very acute antrorsely falcate, superior base truncate inferior cuneate gradually smaller upwards, terminal one usually elongated subrhomboid, sterile ones dentato-serrate, sori subbinous (1—4) linear generally confined to the lower portions of the superior margin, rachis slightly fusco-pubescent, stipes black minutely muricato-scabrous. A. microphyllum, *Kaulf. En. Fil. p.* 204. A. striatum, *Schkuhr. Fil. t.* 18, *f. a—g. (very good).*—*α.* pinnules submembranaceous olive-green. *Kze. in Linnæa*, ix. *p.* 80. *Pl. Exsicc. Poep. in Herb. nostr.* —*β.* rigid almost coriaceous dark brown (when dry). *Klotzsch, in Linnæa*, xviii. *p.* 554, *and in Otto, Pl. Cub. exsicc. in Herb. nostr. n.* 230.—*γ.* rigid, chartaceous olive-brown, pinnules gradually tapering on the long point to an extremely minute ultimate one.

Hab. Jamaica (*Schkuhr*). *α.* Cuba, *Poeppig* (*in Herb. nostr.*) Jamaica, *Mr. Lane.*—*β.* Cuba, *Otto* (*Klotzsch, in Herb. nostr.*)—*γ.* St. Mary's, Jamaica, *Purdie.*—It is unwillingly that I keep this fern distinct from *A. cristatum* of Linnæus. It is true the sori are found very much elongated and constantly so on all the specimens I have noticed above: and they again exhibit three rather distinct appearances. What I call *α.*, which, being Poeppig's plant from Cuba, described by Kaulfuss (and of which Schkuhr's figure is a good representation), may be considered the type of the species, has greener and much more membranaceous pinnules.—Var. *β.* has all the harshness and dark colour of true *A. cristatum*: *γ.* is remarkable for the very regular manner in which the pinnules gradually diminish to a narrow point at the extremity.

96. A. *Kunzeanum*, Kl.; 1—2 feet high, frond bipinnate dark green, pinnæ 3—7 lanceolate acuminate terminal one very long lower ones sometimes bipartite, pinnules approximate chartaceo-membranaceous rather glossy broad dimidiato-oblong or subobcordate often deflexo-falcate, superior base truncated inferior one cuneate, the sterile ones obscurely lobed and serrated, fertile ones with coarser falcate teeth at the upper margin and apex, sori in the deep sinus between two connivent teeth, involucres semilunate, stipes ebeneous sca-

brous, rachis ferrugineo-pilose with woolly hairs. *Klotzsch, in Linnæa*, viii. *p.* 555, *et in Otto, Pl. Exsicc. Cub. n.* 83 (*in Herb. J. Sm., not of Presl*). A. melanoleucum, *Willd. Sp. Pl.* v. *p.* 443. A. lætum, *Presl, Tent. Pterid. p.* 158. A. cristatum, *Kunze, in Linnæa*, ix. *p.* 81.—*Plum. Fil. t.* 96.

Hab. West Indian Islands. St. Domingo? *Plumier.* Jamaica, *Wiles, Mac Nab.* Cuba, *Poeppig* (*Kunze*); *Otto, Klotzsch, n.* 63 (*in Herb. J. Smith*). — Perhaps two better marked species of *Adiantum* of the present section at least, can scarcely be found than *A. cristatum*, L. and *A. Kunzeanum*, and yet few have been less understood. The excellent Swartz probably gave rise to the confusion, by quoting under the *A. cristatum* of Linnæus, the figure in Plum. Fil. t. 96. He observes, it is true, "huic (*crist.* L.) similima sed forte diversa." Thus, too, throwing a doubt on the true *cristatum* of Linnæus. Plumier's figure now quoted is a fair representation (exaggerated as most of his figures are) of the fern called *cristatum* by Kunze; who, as well as other botanists, has been induced to call the true *cristatum* by the name of *A. striatum*. We have again a choice of name for Kunze's *cristatum*. Willdenow by his reference to Plumier "A. lunulis albicantibus signatum, p. 70, f. 96," certainly seems to have had this fern in view in his Spec. Plant.: but the name, however it may answer to Plumier's description, does not answer to the plant. *A. lætum*, Presl, appears to be nowhere described, whereas Dr. Klotzsch has well distinguished the species, and I gladly adopt his name.

97. A. *crenatum*, Willd.; fronds bipinnate, lower pinnæ bi- or tripartite, pinnules ovato-oblong superior base truncated, inferior abscisso-cuneate, superior margin crenated and as well as the apex serrated, sori oblong, stipes glabrous. *Willd. Sp. Pl.* v. *p.* 446. *Plum. Fil. t.* 53.

Hab. Hispaniola, Martinique (*Willd.*)—On this I dare not hazard an opinion, although a figure is quoted in Plumier. Sprengel refers it to *A. politum*, H. B. K. Presl takes no notice of *A. politum*, but retains *A. crenatum*, and brings to it "*A. striatum*, Poeppig, Fil. Exsicc. Kunze:" so that if Kunze's *A. striatum* (Poeppig), be the same as ours, this species is identical with *A. cristatum*, Linn.

98. A. *politum*, H. B.; "fronds bipinnate, lower pinnæ bipinnate, pinnules oblong dimidiate obtuse truncated at the base, superior margin subinciso-dentate, the teeth obtuse bifid, involucres lunate, stipes and rachis shining glabrous." *Willd. Sp. Pl.* v. *p.* 442. *H. B. K. Nov. Gen. Am.* i. *p.* 20.

Hab. Cumana, S. America, *Humboldt and Bonpland.*—As observed under *A. crenatum*, this species is considered by Sprengel identical with that. M. Kunth observes of this Bonplandian plant, "in Herbario Bonplandiano non vidi."

99. A. *pyramidale*, Willd.; "bipinnate, lowest pinna bipinnate, pinnules rhombeo-ovate serrated terminal one very

long linear-lanceolate coarsely serrated, stipes aculeate, caudex creeping." *Willd. Sp. Pl.* v. *p.* 442. Polypodium pyramidale, *Linn. Sp. Pl. p.* 1554. *Sw. Syn. Fil. p.* 72.—*Pet. Fil. p.* 40, *t.* 4, *f.* 2 (*according to Linnæus*). *Plum. Fil. t.* 54 (*according to Swartz and Willdenow*).

Hab. America, (*Linnæus*). Hispaniola, *Plumier*. Linnæus only quotes Petiver's figure; Swartz and Willdenow only Plumier's.—If an *Adiantum* at all, and a good species, and if Plumier's figure be any authority for the Linnæan plant, it may rank near *A. cristatum*, L.

100. A. *polyphyllum*, Willd.; "fronds quadruplicato-pinnate dimidiate obtuse truncated at the base, superior margin inciso-serrate, serratures denticulated, sori oblong." *Willd. Sp. Pl.* v. *p.* 454. *H. B. K. Nov. Gen. Am.* i. *p.* 21 ? (*not Kunze, according to Presl and Klotzsch*).

Hab. S. America, Caraccas, *Bredemeyer*, (*Willd.*)—It is in vain, without authentic specimens, or a good description, to attempt to identify this plant. Kunth, under his *A. polyphyllum*, gives, in the specific character, "pinnules rhomboid-oblong obtuse shortly petiolate upper margin and apex deeply duplicato-crenate,—sori numerous subreniform." — It is no wonder that with such conflicting and inadequate characters other botanists should be led astray. Thus, Kunze's *A. polyphyllum*, for which he cites both Willdenow and Kunth without doubt, is pronounced by Presl to be *different* from that of Willdenow, and called by him *A. myriophyllum*, and by Klotzsch *A. macrocladum*. I must acknowledge the Willdenowian plant to be unknown to me.

101. A. *macrocladum*, Kl.; large quite glabrous, frond bipinnate tripinnate below, pinnæ distant broad-lanceolate attenuated at the base and at the extremity, pinnules dark brownish green opaque submembranaceous crowded slightly imbricated patent obliquely oblong scarcely subfalcate very obtuse cuneate at the base superior base truncated upper margin and apex regularly crenato-serrated, sori copious very small on every lobule on the upper margin, sori small semioval, stipes (tall) and rachis everywhere ebeneous and shining. (Tab. LXXXIII. B.).—A. macrocladum, *Kl. in Linnæa*, xviii. *p.* 554. A. polyphyllum, *Kze. in Linnæa*, ix. *p.* 82, (*excl. syn.*). *Poeppig, Plant. Exsicc. Peruv.* A. myriophyllum, *Presl*, (*name in Tent. Pterid.*)

Hab. Peru, Poeppig, (*Kunze in Herb. nostr.*).— I have only seen the solitary specimen from Kunze, and this is remarkable among the much-branched *Adianta* for the very compact and closely placed pinnules of an almost exactly oblong (or parallelogram) form, obliquely cuneate at the base, and for the small sori. Klotzsch says "ab *Ad. polyphyllo* differt, rachibus pulverulentis (which is certainly not the case in my specimen) nec nitidis, pinnulis falcatis (scarcely so in our specimen) crenato-denta-

tis, nec lobato-crenatis, soris minoribus numerosioribus, indusiis obovato-orbicularibus, striatis, nec reniformibus."

102. A. *Wilesianum*, Hook.; large quadripinnate, pinnæ all distant lanceolate acuminate, pinnules dark brown-green subchartaceous scarcely glossy ovato-lanceolate falcate obtusely acuminate obliquely cuneate at the base superior base truncate upper margin and sometimes the apex crenato-lobate, lobes of the upper margin soriferous, sori in a crenature or sinus of the lobe, involucres reniform rather large firm thick, stipes ebeneous glossy glabrous, rachis rufo-pubescent on the under side. (TAB. LXXXIII. C.) An A. crenatum, *Willd. Sp. Pl.* v. *p.* 446? An *Plum. Fil. t.* 53?

Hab. Jamaica, *Wiles (in Herb. J. Smith)*. Tabasco, Mexico, *Linden, Fil. n.* 1903. — This appears distinct from any species I know. Can it be the *A. crenatum* of Willdenow? who quotes Plumier, t. 53, which is not a very bad representation of this species. If so, it is a native of Martinique and St. Domingo also.

103. A. *Brasiliense*, Raddi; frond rather large quadripinnate, pinnæ approximate all broadly lanceolate acuminate, pinnules closely placed membranaceous olive-brown (when dry) patent oblong subfalcate obtuse obliquely cuneate at the base truncate at the superior base lobed at the upper margin, the lobes crenate and soriferous, sori 5—7 on the superior margin 1 on each lobe, involucres short-oblong reniform convex rather large, stipes and rachis ebeneous glossy, the underside ferrugineo-pubescent. A. Brasiliense, *Raddi, Fil. Brasil. p.* 56, *t.* 76. A. pubescens, *Raddi, Syn. Fil. Brasil. n.* 129.—*Plum. Fil. t.* 53, *according to Raddi, (but scarcely so).*

Hab. Brazil, near Rio, *Raddi, Mrs. Calcott, Gardner, n.* 59, *Burchell Herb. n.* 1816, *Tweedie, n.* 1132. Bahia, *(Herb. nostr.)*. — All my specimens are very uniform in their appearance, and the figure of Raddi in the 'Fil. Brazil.' is a very good representation of a lower branch. In our specimens the pinnules are generally a little shorter than that figure shows them to be, and a little more closely placed. Raddi cites, without any doubt, as a synonyme to this, *Plumier's tab.* 53, which is quoted by Willdenow for his *A. crenatum :* and the figure is more like *A. cristatum* than the present species.

104. A. *cardiochlæna*, Kze.; large tripinnate, pinnæ all lanceolate shortly acuminate, pinnules pale rather bright green membranaceous horizontally patent crowded elliptical oblong (almost a parallelogram) very obtuse nearly straight, the base obliquely cuneate superior base truncate, superior margin and apex lobed and serrated, lobes soriferous, sori on the

superior margin only 5—7 in a sinus or notch of the lobe obovato-reniform large convex thick and hard especially in the disk, stipes and rachis everywhere ebeneous very glossy glabrous. (Tab. LXXXIII. A.) — "A. cardiochlæna, *Kze.*" *Sonder in Herb. nostr.* *An* A. polyphyllum, *Willd. Sp. Pl.* v. *p. 454?*—*β. rigidum;* pinnules subchartaceous, sori larger thicker and more prominent dark brown.

Hab. Caraccas, *Moritz, ex Sonder in Herb. nostr., and Miquel, n.* 15. Venezuela, *Funck, n.* 439. Trinidad, *Aldridge, in Herb. J. Smith.* — *β.* Caraccas, *Linden, n.* 125. — A beautiful and, I think, a well-marked species, and it is a comfort to have a named specimen to refer to it for its authentication; but whether it be a MS. name, or already published by Professor Kunze, I have no means of knowing. It may possibly be the same as *A. polyphyllum*, Willd., which I see is mentioned by Klotzsch as found by Moritz, n. 59 (my specimen bears no number) at Caraccas. If I could be sure of this, I would gladly restore the older name. My var. *β.* differs in the more chartaceous and firmer texture and the larger and darker-coloured and very prominent sori. This species approaches our *A. Mathewsianum* (p. 35), but there the frond is less divided, the pinnules are more rhomboid or cut off as it were at the base by a rather short oblique line, whereas the lower margin in our present species is formed by a straight longitudinal line nearly as long as the pinnule itself.

105. A. *Lobbianum*, Hook.; frond rather ample (a foot and more long) tripinnate, ramifications spreading, secondary pinnæ lanceolate acuminate straight firm, pinnules dimidiato-ovate (lower ones subrhomboid) chartaceous sometimes slightly antrorsely falcate superior base truncate superior margin and round the obtuse apex slightly lobed and serrated, lobules soriferous, sori few generally confined to the lower part of the upper margin small 4—6 on a pinnule, involucres very small black nearly orbicular, stipes elongated and as well as the slender rachis ebeneous glossy glabrous. (Tab. LXXXVI. C.)

Hab. Java, *Thos. Lobb, n.* 264.—My several specimens of this fine fern are very constant in form, and it is difficult to say which are its nearest affinities. The involucres are peculiarly small and dark-coloured, spreading after the dispersion of the capsules.

106. A. *formosum*, Br.; tall spreading, frond large supradecompound deltoid, pinnules small chartaceous obliquely rhombeo-cuneate obtuse lobed or incised and serrated glabrous olive-brown when dry upper base truncate, lobes soriferous oblong-reniform, stipes long rough and as well as the flexuose rachis (partial ones pubescent) ebeneous glossy. (Tab. LXXXVI. B.)—*Brown, Prodr. Fl. Nov. Holl. p.* 155, *(not All. Cunn.)*

Hab. About Port Jackson, abundant, *Brown* and others. Mangatainoka,

N. Zealand, *Colenso*.—A species apparently very common about Port Jackson, but I have not received it from any other locality or country, save the solitary one given by Mr. Colenso. It is a large (3 feet high) and very distinct species, very compound in its ramifications, and easily distinguished from the two following (*A. Cunninghami* and *A. fulvum*) by the position and form of the involucres, here terminating a lobule and oblong, curved or approaching to reniform; in those situated in a sinus and rotundato-reniform, or orbicular-crescent-shaped with a deep rounded notch or sinus.

107. A. *Cunninghami*, Hook.; frond (8—10 inches) deltoid subpedately tri- quadripinnate, secondary pinnæ lanceolate, pinnules rather small chartaceous glabrous olive-brown very glaucous beneath dimidiate broad oblong obtuse often subrhomboid obliquely cuneate, superior base truncate upper margin and round the obtuse apex lobed, lobes emarginate obtuse, sinuses of the lobes soriferous, sori numerous rather large 7—10 on a pinnule, involucres orbicular-cordate with the sinus deep and narrow, stipes smooth elongated and as well as the flexuose rachis everywhere ebeneous glossy and quite glabrous. (Tab. LXXXVI. A.) A. formosum, *All. Cunn. Bot. N. Zeal. in Hook. Comp. to Bot. Mag.* i. *p.* 366, (and of other authors on N. Zealand Botany), *not Br.*

Hab. N. Zealand, Northern Island, *A. Cunningham, Sinclair, Colenso* (*nos.* 1670, 2037, 2045 *and* 6), *J. D. Hooker, &c. &c.*—This is a well-marked species of the same group, as to habit, with the foregoing and following one; but the pinnules are always larger, more generally oblong, very glaucous beneath, the sori larger, and always placed in a notch of a lobe of the margin (not in the sinus between the lobes, nor from the apex of a lobe), the stipes is quite smooth and the rachis is everywhere perfectly glabrous. Numerous specimens gathered at different periods are quite uniform as to the above characters. The fructifications are very conspicuous on the glaucous surface of the pinnules from their dark brown colour with a pale membranous margin, giving the edge of the pinnule an ocellated appearance. —Caudex very long, creeping, as thick as a goose-quill.

108. A. *fulvum*, Raoul; frond (1 foot) ovato-deltoid subpedately tri- quadri- pinnate, secondary pinnæ lanceolate acuminate, pinnules rather small chartaceous bright olive green subglossy glabrous or pubescenti-hirsute (never glaucous beneath) dimidiato-oblong obtuse obliquely cuneate at the base (usually broadly cultriform) rarely subfalcate superior base truncate superior margin and obtuse apex lobed the lobes emarginate obtuse, sinuses of the lobes soriferous, sori numerous rather large 8—12 on a pinnule, involucres orbicular-cordate with the sinus deep and narrow, stipes very scabrous almost muriculate, rachis also scabrous and downy with fulvous hairs. (Tab. LXXXV. A.) A. fulvum, *Raoul, Choix de Pl. de la Nouv. Zeal. p.* 9.

Hab. New Zealand, Northern Island, *Colenso, J. D. Hooker, Dr. Sinclair, &c.* Banks' Island (off the southern or Middle Island), *Raoul.*—Dr. Hooker, on his return from the Antarctic voyage, brought home copious specimens of this species, gathered by Mr. Colenso and himself in N. Zealand, and Mr. Raoul has named it and clearly defined it in his beautiful and accurate work above quoted. The term he uses for the pinnules ("obliquè cultriformes") is singularly applicable to the majority of the pinnules as distinguishing the species from its nearest affinity *A. Cunninghami* (*A. formosum* of N. Zealand botanists), with which it quite agrees in the position and form and colour of the involucres:—but the plants are much larger (2—2½ feet, including the stipes), never glaucous, but pale and rather bright olive-green beneath, even when dry; the stipes too is singularly rough, almost muricated, scaly at the base where it rises from the elongated stout caudex. *A. affine* (our No. 65) is a much smaller more slender and more pedate plant, with very thin membranous pellucid pinnules, and more membranous white-coloured involucres, seated in a deeper sinus. Some of our specimens of *A. fulvum* have rigid slender hairs or aciculi like those of *A. affine*, but they are deciduous or not constant nor common.

Dubious Species or Synonymes to other Plants.

Adiantum *rotundatum*, Kze.; "frond linear-lanceolate glabrous pinnated, pinnæ alternate petiolate approximate transversely oblong subfalcate very obtuse ultimate ones obovate small truncated at the base, upper margin and at the apex inciso-lobate, lobes obtuse toothed at the point, fertile ones excised, involucres large reniform brown, the base of the glabrous stipes and the rachis chaffy. "*Kze. Fil. Afr. Austr. in Linnæa*, x. *p.* 528, *(not Desv.)*

Hab. "Specimen Lutetiæ Parisiorum ex amica manu Mairii accepi, in cujus herbario schedulæ, 'promontorium Bonæ Spei' adscriptum fuit. Quis ibi collegerit nescio."

"Quamquam de patria speciei non omnino certus sim, tamen insignem plantam hic præterire nolui. Specimen 16 pollices longum, simul sumpto stipite 6-pollicari, supra sulcato, purpureo, nitidissimo, basi paleis linearibus rufis obducto. Rachis stipiti similis, sed paleis sparsis tenuissimis. Pinnæ maximæ 9 lineas longæ, versus basin minus, quam apicem versus decrescunt. Laminæ obovatæ, 3 tantum lin. longæ, 2 latæ et vix amplius lobatæ. Proximum *A. lunulatum*, Burm. (Hook. et Grev. Ic. Fil. t. 104), quod vero pinnis lunatis, longius pedicellatis, imprimis vero soris linearibus confluentibus abundè differt." *Kze. l. c.*

Adiantum *Capense*, Thunb. and Kze. in Linnæa, x. p. 530, is *Cheilanthes Capensis*, Sw. and others.

Adiantum *radiatum*, L., will here be found under *Hypolepis.*

Adiantum *decipiens*, Desv.; "pinnæ glabrous oblong obtuse dimidiate the base truncate, upper margin lobato-subincised, segments contiguous retuse, involucres smooth, stipes and rachis sparsely paleaceo-pilose rooting at the apex." *Desv. in Mém. Soc. Linn.* ii. *p.* 307.

Hab. Java. "Præcedenti (*A. rhizophoro*, Sw., *A. caudato*, nobis), proximum, sed diversissimum."

Adiantum *papyraceum*, Desv.; "pinnæ subopposite subrhomboid cuneate and entire at the base dentato-incised striated, capillary stipes and rachis pubescent." *Desv. l. c. p.* 307.

Hab. "Mauritius."

Adiantum *cassioides*, Desv.; "fronds densely pinnated, pinnæ imbricato-pinnate, pinnules rhombeo-ovate cuneate at the base denticulated, stipes angular, rachises pubescent." *Desv. l. c. p.* 310.

Hab. Warmer parts of America, *(Desv.)*. "Pinnæ of *A. obtusum*, but the frond more leafy." *Desv.*

Adiantum *rotundatum*, Desv.; "pinnules ('pinellis consistentibus') subrotundato-cuneate entire obscurely sinuoso-trilobate, sori subreniform, stipes glabrous." *Desv. l. c. p.* 310.

Hab. Peru, *(Desv.)*. "Lower pinnæ about 6 inches long; pinnules 4—5 lines broad, less than that in length."

Adiantum *pauperculum*, Kze. in Schk. Fil. Suppl. ii. p. 65, t. 127, will be here placed under *Hypolepis*.

Adiantum *pallens*, Sw., forms our next genus, *Ochropteris*, J. Sm.

2. Ochropteris, *J. Sm.*

(Hook. Gen. Fil. Tab. CVI. A.) Adiantum, *Sw.* Cheilanthes, *Bory, Pr.*

Sori marginal, always occupying the apex of a lobe, transversely oblong, uniform. *Involucre* of the same shape with the sori, formed of the reflexed margin of the frond, nearly of the same colour and texture, and covering the sorus which occupies the apex of 3 or 4 veinlets terminating at the base of the involucre.—Fern *of Mauritius.* Frond *deltoid, on a long, glabrous* stipes, *very decompound, ultimate* pinnules *lobed, the* lobes *cuneate soriferous, the whole coriaceous and glossy.* Stipes *and* rachis *pale-coloured.* Veins *dichotomously divided.*

Obs. Kaulfuss long ago observed of the *Adiantum pallens*, Sw., "habitu et fructificatione ab omnibus diversissimum, proprium constituet genus:" Mr. J. Smith has however more justly observed that the chief distinction is in the *habit*, which neither harmonizes with *Adiantum* nor with *Cheilanthes*, nor with *Hypolepis*; so that I gladly adopt Mr. J. Smith's name of *Ochropteris*, derived from the pale colour of the entire fern, but especially the stipes and rachis.

1. O. *pallens* (Tab. LXXVII. B.), J. Sm. Gen. Ferns, p. 46.—Adiantum pallens, *Sw. Syn. Fil. p.* 125 *et* 323. *Willd. Sp. Pl.* v. *p.* 453. Cheilanthes davallioides, *Bory, in Willd. Sp. Pl.* v. *p.* 461.

Hab. Mauritius, *Grœndal* (Sw.) and others.—Bojer states that it is found in Madagascar. Swartz, at p. 125 of his 'Species Filicum,' gives "Mauritius?" with a mark of doubt of its native country, and "Chusan" without any question; the latter apparently upon the authority of a most unsatisfactory figure in Plukenet's 'Amalth. Bot.' of a "Filix Adianto nigro officinar. similis, pediculo viridi, pinnulis magis eleganter incisis; ex insula Cheusan, tab. 403, f. 2." We have received many ferns from China of late, and particularly from Chusan, but this species was never among them, and we doubt if it is found there at all. Our copious specimens from different individuals are entirely from Mauritius, and it is probably peculiar to that country, unless Bojer should be correct in giving Madagascar.—Stipes 2 feet long; frond about equal in length with the stipes.

3. Lonchitis, *Linn.*

Lonchitidis sp. *L. et Auct.*

Sori marginal, situated in the sinuses of the segments of the frond, oblong or linear, reniform or lunate, situated at the apex of several converging veinlets. *Involucre* more or less elongated, of the same shape with the sorus, membranous, scariose, formed of a reflexed but changed portion of the frond, covering (while young) but not bearing the capsules.—Ferns *of Mauritius, Madagascar, the Cape, and S. America.* Rhizoma *subglobose.* Fronds *fascicled, large, submembranaceous, bi- tripinnate, the* pinnæ *sinuato-pinnatifid: the sinuses only soriferous.* Veins *anastomosing* and forming very irregular hexagons; several veinlets uniting at the sinus to bear the sorus.*

Obs. Notwithstanding that the fructification resembles that of *Cheilanthes*, and especially that of *Hypolepis*; yet the species are widely distinct in habit from those two genera: and, in conjunction with the reticulated frond, may well be allowed to remain as a genus. It would indeed be a reticulated *Pteris* (or *Litobrochia*) but for the short sori: and hence the *L. hirsuta*, Lin. (not of Sieber) of the West Indies, though with the fructification of *Lonchitis*, chiefly confined to the sinus of the lobules, is now transferred to *Pteris*, on account of pinnato-furcate venation. In *Lonchitis*, if I may

* From the costa or midrib on the pinnules, parallel pinnated veins diverge, corresponding with a lobe at the margin, these veins are connected by a veinlet running parallel with the midrib and at a little distance from it, forming a number of transversely oblong areolæ; all between these areolæ and the margin is more or less closely reticulated.

so say, the centre of the sorus, be it long or short, is in the very axil of the sinus, whence it extends along the margin on both sides. In *Pteris* it originates at the side of the lobes, and extends to the axil.

1. L. *aurita;* "fronds pinnate, pinnæ pinnatifid lowermost ones bipartite the lobes obtuse waved toothed at the apex, stipes aculeated." *Sw.—Linn. Sp. Pl. p.* 1536. *Willd. Sp. Pl.* v. *p.* 462.—*Plum. Fil.* 14, *t.* 17. "*Petiv. Fil. p.* 172, *t.* 4, *f.* 4."

Hab. Martinique.—This is quite unknown to me; and is perhaps altogether taken up, by Linnæus and succeeding authors, from the figures above quoted. It has the reticulated venation and the short lunate sori of true *Lonchitis;* but the bipartite lower pinnæ and the aculeated stipes are at variance with other species of the genus. It appears to be unknown to any author since the time of Plumier: according to his figure however the sori are quite those of the present genus, in shape and situation.

2. L. *Lindeniana;* fronds ample (bi?-) pinnate thick-membranaceous opaque on both sides copiously clothed with fulvous hairs, pinnæ (or pinnules) sessile a span long broad-lanceolate acuminate deeply pinnatifid the ultimate ones decurrent into a bipinnatifid apex, lobes ovate with very deep sinuses, upper ones rounded with small shallow sinuses all copiously reticulated, sori numerous small lunulate and occupying the axil of the shallow sinuses or elongated and though the centre appears to be in the very axil of the sinus the two extremities extend up the entire sides of the sinus, stipes (of which we have only a small portion) unarmed and as well as the main rachis furrowed on one side densely beset with spreading ferruginous hairs. (TAB. LXXXIX. A.)

Hab. Caraccas, S. America, *Linden, n.* 543.—It is also in Mr. J. Smith's herbarium from the Paris garden (Jardin des Plantes) without any locality being given.—I give this with great hesitation as a species of *Lonchitis;* though the general habit and venation are entirely those of *L. pubescens* of the Mauritius: but the frond is thicker, more dense and opaque, the under side of the main rachis is semiterete (not furrowed), and the sori, though I believe in all cases originating in the axil of a sinus (as in *Lonchitis*) extend, in the deeper sinuses, for a great way up the sides, so that it is extremely difficult to say whether this should be a *Pteris (Litobrochia,* according to venation) or a *Lonchitis.* I ought to observe that though my specimen from Linden is 3 feet long, yet it may not exhibit the entire frond: the true stipes is wanting, and *probably* the *lower pinnæ* are wanting also. If these latter should prove to be bipartite, that circumstance would bring our plant near to the *Lonchitis aurita,* L. (Plumier, Fil. t. 17): but there the sori are small and uniform in the deep as well as in the shallow sinuses.

3. L. *pubescens,* Willd.; fronds ample bipinnate pubescenti-hirsute with fulvous hairs especially beneath, pinnæ

sessile pinnatifid at the apex, pinnules sessile broad-lanceolate acuminate sinuato-pinnatifid much reticulated, the lobes entire or sinuato-lobate, the sinuses soriferous, stipes and rachis everywhere densely hairy.—" *Willd. Herb.*" *Kaulf. En. Fil. p.* 195. *Presl, Tent. Pterid. p.* 163, *t.* 6, *f.* 29, *(pubescence omitted). Hook. Gen. Fil. t.* 68, A. L. hirsuta, *Bory, Voy.* i. *p.* 321, *(name only). Wall. Cat. n.* 2190. *Sw. Syn. Fil. p.* 93, *(in part). Schkh. Fil. p.* 81 *(in part), tab.* 2, *not tab.* 86, *(not Linn.)*

Hab. Mauritius, *Bory, Commerson (in Herb. nostr.), Sieber, Wallich, Telfair*, and others.—This species has been much misunderstood and mixed up with others. I have copious specimens from Mauritius, where it is abundant in moist woods, and to which island I believe it is peculiar. Bory, who perhaps first noticed it, considered it to be the *L. hirsuta* of Linnæus, a West Indian plant, for which the authority is Plumier ; " Fil. villosa, pinnis quercinis," tab. 20; but that has free, not anastomosing, veins. That author (Bory) expressly gives it as a native of Mauritius, for when speaking of his *L. glabra* of Bourbon, he says, " Je remarquai (in Bourbon) un beau *Lonchite* dont les feuilles ont une couleur obscure, et qui je crois différent du Lonchite velu (*L. hirsuta*, L.) si commun à l'Isle de France." Yet Swartz, on Bory's authority, evidently I think by mistake, gives " Bourbon " as the country of this. Willdenow rightly confines the *L. hirsuta*, L. to the West Indies, whence we have specimens showing the venation of true *Pteris*. Kaulfuss first took up the Mauritius species with the MS. name from Willdenow's own herbarium. — The fronds are dingy brown when dry.

4. L. *Natalensis*, Hook. ; fronds ample bipinnate moderately hirsute on both sides with pale-coloured hairs, pinnæ more or less petiolate the upper half pinnatifid, pinnules few sessile broad-lanceolate acuminate much reticulated nearly entire or moderately lobed in the lower half, lobes rounded entire short, the sinuses and entire margins soriferous, sori small, stipes and rachis downy. (Tab. LXXXIX. B.) — L. glabra, *Pappe, MS. in Herb. Hook.—(not Bory).*

Hab. Shady places at Port Natal, South Africa: communicated by *Dr. Pappe*, 1845. — I find nothing like this among my copious specimens of *L. pubescens* from Mauritius. The size is about the same, but the fronds are less pubescent and less densely hairy, drying of a full green colour; the pinnæ or primary divisions are stalked, and a great portion of them, the upper half, are pinnatifid, the lobes there and the pinnæ below more entire, the lobes, when lobed at all, short and never again sinuated or lobed, and the sori are smaller, frequently appearing where there is no perceptible sinus:—the rachis and stipes are not densely hairy with patent fulvous hairs, as in *L. pubescens*, but simply downy.

5. L. *glabra*, Bory ; fronds (2 feet long) bipinnate membranaceous with scattered fulvous hairs on the stipes rachis midrib and veins on both sides, pinnæ sessile oblong-ovate

acuminate reticulated with very few areolæ pinnatifid at the apex, pinnules lanceolate obtuse lobato-pinnatifid all of them decurrent so as to constitute a broadly winged rachis to the pinnæ, the inferior pinnule above (next the main rachis) dwarf, lobes rotundate entire, sinuses soriferous, sori small lunate, stipes paleaceous below.—L. glabra, *Bory, Voy.* i. *p.* 321. *Sw. Syn. Fil. p.* 93. *Willd. Sp. Pl.* v. *p.* 463. *Kze. Schkh. Fil. Suppl. p.* 153, *t.* 66. "*Schlecht. Adumbr. Fil. Cap. p.* 47, *t.* 27." *Kunze in Linnæa, Fil. Afr. Austr.* x. *p.* 528: *and in Drège, Pl. Cap. Exsic.*

Hab. Bourbon, *Bory.* South Africa, *Drège, Dr. Alexander.*—The specimen from which I have drawn up my character and from which the figure is made, is a part of the South African collections made and distributed by Drège, with the name "*L. glabra*, Bory," attached: it ought therefore to be the same as the *L. glabra* of Kunze in the 'Linnæa' above quoted, which is from a plant of Drège. Kunze refers it without doubt to the *L. glabra* of Bory and Schlechtendal, and of the latter author he adduces the description and figure, p. 47, t. 28, of his 'Adumbratio.' My copy (incomplete) of that work, though presented by the author, does not contain so many pages nor so many plates, and I have no means of testing their identity. It is probably the same as Bory's plant of Bourbon, for that author says the frond is of a full or dark green colour, and Willdenow says "pinnulæ bipollicares lanceolatæ acuminatæ (scarcely in our specimens) sessiles *alato-decurrentes apicem versus confluentes*" &c., which is a characteristic mark in our plant.

6. L. *Madagascariensis*, Hook.; fronds bipinnate? pinnæ pinnate throughout slightly hairy, pinnules shortly stipitate triangular-oblong gradually acuminated much reticulated below sinuate scarcely lobate the base broadly cordate, terminal one large attenuated deeply sinuate towards the base and hastate, sori somewhat elongated situated in the shallow sinuses, rachis (of the pinnæ) slender downy. (TAB. LXXXVII. B.)

Hab. Madagascar, *Dr. Lyall.*—This is an extremely different species from any of the previous ones. All that I possess appears to be a pinna a span or more long, with 5 pairs of nearly opposite pinnules, and a large terminal one which is quite hastate at the base and deeply sinuate on each side above the base, the sori are narrow and more or less elongated, always occupying a sinus of the margin of the pinnules. The reticulation is copious, resembling that of *L. pubescens*, not at all like *L. glabra.*

Lonchitis hirsuta, L., is a *Pteris.*

Lonchitis repens, L., is *Hypolepis repens,* Pr.

3. HYPOLEPIS, *Bernh.*

(HOOK. GEN. FIL. TAB. LXVII. A. ("Cheilanthes") and B.)—Cheilanthis Sp. *Sw. et Auct.* Adianti Sp. *Bory.* Lonchitidis Sp. *L.*

Sori marginal, subglobose, small, distinct, uniform. *Involucre* of the same shape as the sorus, formed of the more or less changed and reflected margin of the frond, usually situated in a sinus and covering the sorus, which occupies the apex of a veinlet. — *Tropical or subtropical* Ferns, *having a more or less creeping* rhizoma. Fronds *variable, simply pinnated or more frequently bi- tri- quadri- pinnate; sometimes compoundly pinnatifid* (H. Californica), *generally membranaceous or chartaceous,* rachis *and* stipes *sometimes opaque and pubescent or muricated, sometimes ebeneous and very glossy.* Sori *frequently in a sinus of the lobes or teeth of the pinnule, and occupying their lower and inner side.* Veinlets *forked, free, often diverging, never anastomosing, the apex of a single one bearing the sorus.*

OBS. With few exceptions, the species of this genus have been referred to *Cheilanthes.* It was established by Bernhardi, in Schrader's 'Neues Journal für die Botanik,' erster band, p. 34. "HYPOLEPIS; *Sporangia* catheto-gyrata in receptaculo punctiformi. *Hyposporangia* propria semiorbicularia, margine recto affixa, *circulari, libera.*" — The only Fern which he refers to it is *Lonchitis tenuifolia,* Forst. (Cheilanthes arborescens, *Sw.*) Presl, in his 'Tentamen Pteridographiæ,' both by the several species he adduces, and by his character of the fronds, "amplæ supradecompositæ," limits the genus to those very much branched and generally membranaceous species (corresponding with the *Microlepia*-group of *Dicksonia*), —and of which *Lonchites tenuifolia,* L., is the type: and Mr. J. Smith adopts the same view of the genus *Hypolepis* as Presl, as we find by the references in his 'Arrangement and Definition of the Genera of Ferns,' and by his remarks there. "This genus," he observes, "is formed of a group of species characterized by their large decompound fronds, which arise from a lengthened creeping rhizoma, similar in habit to some of the large-fronded species of *Polypodium,* and differing from them only in the soriferous crenule being altered in texture, and reflexed, forming a simple lateral *indusium* with the *sporangia* in its axis, and therefore not distinct in that respect from the genus *Cheilanthes:* but their whole habit naturally indicates them to be a distinct group from the species which I retain as true *Cheilanthes.*" — Practically, however, it seems impossible to restrict *Hypolepis* to the large decompound fronds. Species with less divided fronds, yet in other respects of similar habit, claim admission, and I cannot in any way see how the composition alone can form the character of this or any other genus of Ferns. Kunze, though he does not adopt the genus *Hypolepis,* yet often alludes to it as a genus of others, and in his 'Index Filicum in Hortis Europæis cultarum,' in vol. 23 of the 'Linnæa,' under *Cheilanthes,* has distinguished by the letter (b) what would be *Hypolepis,* and it is quite

clear from this that he is not guided by the composition of the frond, but by the nature of the involucre, separate and free and more or less approaching to orbicular: *Hypolepis*, in fact, in the sense in which Bernhardi intended it. This is the principle I have followed in the genus as here laid down; and if thereby I have not preserved *Hypolepis* with so marked a natural habit as by the arrangement of Presl and J. Smith, yet I have weeded *Cheilanthes* of several rather anomalous species of that genus, in which, as it now stands, the sori are more or less confluent, and border so closely upon *Pteris*, that clearly defined limits cannot possibly be detected between them. Thus, I have referred *Adiantum radiatum*, L. (Cheilanthes, *Br.* and *J. Sm. MS.*) to *Hypolepis*, rather than to *Cheilanthes* proper, and others with a somewhat similar habit. On the other hand, I have preserved *Cheilanthes spectabilis*, Kaulf., in *Hypolepis*, where Link and Presl and Kunze have placed it, although the involucres are frequently continuous. It is a remarkable fact in this species, that, sometimes, the sori are seen in nearly round dots, in other specimens elongated to a considerable extent. Such and other difficulties are met with in almost every extensive genus of Ferns, and should lead us not to think harshly of others whose views on the genera of Ferns may happen to differ from our own.

(*Tri- quadri- pinnate, or more or less tri- quadri- pinnatifid.* Hypolepis, *Pr., J. Sm.*)

1. H. *tenuifolia*, Bernh.; fronds ample quadripinnate membranaceo-chartaceous, primary pinnæ ovate acuminate, secondary and tertiary lanceolate acuminate rather remote, pinnules narrow-oblong slightly falcate and acuminate entire or toothed or lower ones pinnatifid monosorous on the inner margin of the lobe, involucre semiorbicular submembranaceous, stipes slightly rough towards the base generally pale (sometimes darker) brown more or less hairy, rachis and midrib generally downy with crisped hairs, costa and often the underside of the pinnules slightly hairy and occasionally glandular. (Tab. LXXXIX. C.) — *Bernhardi in Schrad. Neues Journ. für die Bot.* i. *p.* 34. *Presl, Tent. Pterid. p.* 162, *t.* 6, *f.* 29. Lonchitis tenuifolia, *Forst. Prodr. n.* 424. Cheilanthes arborescens, *Sw. Syn. Fil. p.* 129, *t.* 336. C. dissecta, *Hook. et Arn. Bot. of Beech. Voy. p.* 75. — β. lobes of the pinnules rather broader more membranaceous and herbaceous more cut at the margin. — γ. lobes of the pinnules larger than in β. more obtuse more coriaceous and still more cut at the margin, involucres larger more of the texture of the frond, the whole frond when dry rich yellow or golden brown, hairs on various parts of the fern longer and more crisped. (Tab. XC. A.) Cheilanthes pellucida, *Colenso, in New Ferns of New Zeal. p.* 13.

Hab. Tanna, New Hebrides, *Forster*, (v. s. *in Herb. Banks.*) Coral Islands, *Beechey*. New Zealand, Northern Island, *All. Cunningham*, *Co-*

lenso, *J. D. Hooker*, and others. Luzon, *Cuming*, *n.* 118 and 233 (stipes and rachis browner).—β. New Zealand; Wahaki, *Dr. Sinclair*. Bay of Islands, *J. D. Hooker*.—γ. Between Cape Brett and Wangarei Bay, East Coast, N. Zealand, near the coast; scarce, and found nowhere else. (Tab. XC. A.) *Rev. W. Colenso*, *n.* 420.—Our specimens most in accordance with Forster's plant are those from the Coral Islands (some without any habitat given) in the late Capt. Carmichael's collection, and some of Dr. Hooker's from New Zealand. Forster's original plant is, however, rather more slender and the pinnæ and pinnules more erect and attenuated than any we possess: and it must be confessed that the difference between that and our var. γ. strike the eye, at first sight, as being very considerable. Certainly no figure of any small portion of a plant will give an accurate idea of the species itself, still less of the varieties. Yet from New Zealand alone, I possess specimens which almost satisfy me that I am correct in making varieties rather than in forming species. Even of the most remarkable variety, that of our valued friend Mr. Colenso, I find a specimen marked "N. Zealand," from Capt. Carmichael's herbarium, which seems to unite β. with γ.—We have received this and other species from N. Zealand as "*Cheilanthes ambigua*, A. Rich.": and we are not sure but this is the *C. ambigua* of Allan Cunningham, judging from a specimen we have received from Mr. Heward. Richard expressly says of his *C. ambigua*, "Au premier abord, et quand les fronds sont bien développées, on pourrait la prendre pour une espèce de *Polypodium*. En effet les sores sont arrondis, distincts et nus, correspondant à chacune des dents ou divisions des lanières. Mais si l'on examine ces frondes avant leur épanouissement, on voit alors que les divisions sont recourbées en dessous, et qu'elles recouvrent complètement chacun des sores, en lui formant une sorte d'involucre, sans néanmoins changer de nature." (Voy. de l'Astrolabe, Bot. i. p. 84).—All this seems to point to a *Polypodium* common in New Zealand, frequently confounded with our *H. tenuifolia*, for its general aspect is very similar, probably identical with the New Holland *Polypodium rugulosum*, La Bill., and also with *Cheilanthes viscosa*, Carm., of Tristan d'Acunha, (Polypodium, *Spreng.*) In an old state of these, the teeth or lobules of the pinnules may be seen to form an arch over the sori without altering in texture: this however is very different from the involucre of *Hypolepis:* as may be seen in a portion we have represented of the var. γ. of the present species. (Tab. XC. A.)—There is probably some error in this species being called by Forster, and others after him, an "arborescent" fern.

2. H. *Guianensis*, Kl.; "rhizoma? frond tripinnatifid ovato-acuminate, rachises and stipes yellowish unarmed subviscoso-pubescent, pinnæ broadly lanceolate acute, secondary pinnæ lanceolate falcate obtuse sparingly puberulous on both sides, beneath bright above brownish green, pinnules lanceolato-oblong subfalcate rounded at the apex obsoletely pinnatifido-lobate sessile." *Klotzsch, in Linnæa*, 1847, *p.* 339.

Hab. British Guiana, *R. Schomburgk*, *n.* 1166.—"Frond 2 feet long. Superior pinnæ 3 lower ones 6 inches long attenuate confluent towards the apices."—Of this species I know nothing, and nothing is said of the sori and involucres.

3. H. *dicksonioides*; "frond ample ovate membranaceous

on both sides (more copiously beneath) glanduloso-pilose tripinnato-pinnatifid less divided at the apex, pinnæ subopposite and as well as the primary pinnules ovato-oblong acuminate, secondary ones oblong obtuse pinnatifid, segments shortly oblong subtruncate at the apex inciso-serrate, the base above or on both margins soriferous, sori solitary, stipes and rachis furrowed above and as well as the creeping caudex reddish-yellow glanduloso-pilose." *Kze.*—Cheilanthes dicksonioides, *Endl. Prodr. Fl. Norf. p.* 15. *Kze. in Schkh. Fil. Suppl.* i. *p.* 13, *t.* 8. Hypolepis Endlicheriana, *Presl, Tent. Pterid. p.* 162. —*β. phyllochlæna;* indusio (spurio) frondoso. *Kze. in Linnæa, t.* 17, *p.* 275.

Hab. Norfolk Island, *Bauer*, (*Kunze*). — *β.* Neilgherries, (*Kunze*). — Kunze in the work just quoted gives as synonymes, Endlicher's *Cheilanthes dicksonioides* and Presl's *Hypolepis Endlicheriana*, and in 'Linnæa,' xxiii. p. 243, he adduces *Dicksonia davallioides*, Br. Prodr. p. 158, (Sitolobium, *J. Sm.*): but, judging from the figure, for I have never seen an authentic specimen of the species, I do not at all see how this plant differs from the New Zealand state of what I have considered a slight variety (*β.*) of *Hypolepis tenuifolia*. At any rate it must be very closely allied to it, and I place it near to that, although its author compares it with *H. repens*, a species, as far as I know, confined to the New World. In the 'Linnæa' above quoted, too, Kunze gives his *C. dicksonioides* as a native of N. Holland.—Kunze again in the 'Linnæa,' xvii. p. 275, in describing the Ferns of the Neilgherry hills, notices a *Cheilanthes* (Hypolepis) which he does not distinguish from the *dicksonioides* except by the (spurious) frondose indusium.

4. H. *amaurorachis;* "frond membranaceous piloso-scabrous ovate acuminate bi- or tri-pinnato-pinnatifid less divided at the apex, pinnæ petiolate divergent ovato-oblong acuminate the lowest ones opposite, primary pinnules decurrent oblong obtuse, secondary ones sinuato-incised the segments nearly entire soriferous on both sides, involucres (spurious) herbaceous, rachises and stipes asperous purple-brown, rhizoma creeping branched squarrose with brown chaffy hairs." *Kze.*—Cheilanthes amaurorachis, *Kze. in Linnæa*, 1850, *p.* 242 (*name*) *and p.* 306 (*descr.*)

Hab. New Holland, *Kunze*, who compares the species with his *Cheilanthes* (Hypolepis) *dicksonioides;* but remarks, "minus composita, minor, rachi stipiteque purpurascenti-fuscis, laciniis subintegerrimis nec inciso-serratis."

5. H. *setigera;* "frond below tri- above bi-pinnatifid membranaceous, the costa and secondary rachises upon the upper side pubescent, pinnules sessile lanceolate acute deeply pinnatifid confluent towards the apex, segments oblong rather obtuse toothed, sori solitary at the interior margin of a tooth,

involucres obsolete, stipes and universal rachis sparingly setose." Cheilanthes setigera, *Blume, En. Fil. Jav. p.* 138.

Hab. Lofty mountains of Java.—This and the three following species of *Cheilanthes* of Blume I refer to *Hypolepis* (three of them from individual knowledge), because the author says of them in his Enum. Fil. Jav. p. 135, "tam habitu quam forma sororum maxime cum *Cheilanthe arborescente*, Sw., congruunt;" and he adds "melius forsitan foret, species, quarum sori unico laciniarum lateri insident, a ceteris, ut genus *Cheilanthem* inter et *Lonchitidem* intermedium separare."—Of the present, *H. setigera*, he remarks that it differs from the following in the sharper pinnules, the segments narrower and toothed, the universal rachis furnished with long setæ.

6. H. *alpina;* "frond below tri- above bi-pinnatifid membranaceous pubescent, pinnules subsessile lanceolate rather obtuse deeply pinnatifid confluent above, sori solitary at the interior margin of the crenulations, involucres dentiform, stipes and rachis rough." Cheilanthes alpina, *Bl. Enum. Fil. Jav. p.* 138.—*β.* frond coriaceous, pinnules acute, segments crenate the margins recurved, stipes and rachis tomentose. *Bl. l. c.*

Hab. Summit of Mount Gede in western Java; *β.* on the lofty mountains of Java, *Blume.*—"The place of this is after *Cheilanthes repens*, Kaulf."

7. H. *resinifera;* "frond below tri- above bi-pinnatifid subcoriaceous beneath resinoso-punctate, pinnules sessile lanceolate acuminate deeply pinnatifid confluent above, the segments oblong obtuse inciso-crenate subauriculate at the base above, sori solitary at the interior margin of the crenulations, involucres dentiform, rachis tomentose above, stipes rough." Cheilanthes resinifera, *Blume, Enum. Fil. Jav. p.* 138.

Hab. Thick woods interior of Java, *Blume.* "Near the latter species (*C. alpina*), but distinct in the much acuminated pinnules, resinoso-farinose beneath, hairy, the lower crenule or lacinula of the segments larger on the upper side."

8. H. *polypodioides;* "frond (ample) triplicato-pinnate, pinnules petiolate ovato-lanceolate acuminate bipinnatifid confluent above, secondary ones oblongo-lanceolate deeply pinnatifid, the segments obtuse subduplicato-serrate, sori distinct, involucres dentiform, stipes and rachis pubescent scabrous." Cheilanthes polypodioides, *Bl. Enum. Fil. Jav. p.* 139.

Hab. Gede and other high mountains of Java, *Blume.*—"*Cheilanthes arborescens*, Sw., differs from this in the glabrous frond and the solitary sori at the interior or superior margin of the segments: from *C. resinifera* it is distinguished by the larger triplicato-pinnate frond, and by the larger, acuminated primary pinnules." *Bl.*

9. H. *pallida*; "frond ample triplicato-pinnate subcoriaceous, beneath (pale yellowish and) pubescent, pinnules petiolate oblong-lanceolate acuminate bipinnatifid confluent above, secondary pinnules oblong obtuse pinnatifid, the segments obtuse crenulate, sori solitary on the anterior margin of the laciniæ; involucres dentiform, stipes and rachis scabrous tomentose above." Cheilanthes pallida, *Bl. Enum. Fil. Jav. p.* 139.

Hab. Woody mountains, Province of Bantam, western Java. — "From *Ch. arborescens*, Sw., this is distinguished by its frond being pubescent beneath; from *Ch. polypodioides*, in the smaller and more rigid pinnules, the segments shorter, obsoletely crenulated, mono- rarely poly-sorous."—Of this and *H. polypodioides* and *alpina* I have been favoured with portions of specimens from the distinguished author, but they will hardly suffice to justify me in forming an opinion about them. They assuredly border very closely on *H. tenuifolia*.

10. H. *repens*, Presl; fronds ample tri-pinnate between membranaceous and coriaceous yellow or tawny green (when dry) opaque, primary pinnæ ovate acuminate, secondary ones lanceolato-acuminate glabrous or very sparsely hirsute, pinnules or ultimate segments oblong obtuse slightly falcate entire or pinnatifid, lobes oval-oblong obtuse bearing usually a single sorus on their anterior margin, involucres small squamiform, stipes and principal rachises glabrous yellow-brown glossy aculeated. (Tab. XC. B.) *Presl, Tent. Pterid. p.* 162. Lonchitis repens, *L. Swartz, Syn. Fil. p.* 93. *Willd. Sp. Pl.* v. *p.* 464. Cheilanthes repens, *Kaulf. Enum. Fil. p.* 215. Ch. aculeata, *Kze. in Linnæa*, 1850, *p.* 245. *Kaulf. in Bot. Zeit.* 1823, *p.* 367. Hypolepis repens et aculeata, *J. Sm. Sieber, Fl. Martin. n.* 373. *Plum. Fil. t.* 12, (much exaggerated).—*β. ? inermis;* rachises and stipes smooth (not aculeated).

Hab. Martinique, *Plumier, Sieb. l. c. n.* 373, (*in Herb. nostr.*) Jamaica, *Wiles, Dr. Bancroft, Purdie.* Brazil; Ilhios, *Moricand*, n. 2460; Organ Mountains, *Gardner, n.* 199. Galapagos, *Capt. J. Wood, R. N.* Tovar, Columbia, *Moritz.* (*Herb. Sonder, n.* 387). *β.*? New Grenada, *Purdie.*— Plumier's figure, which is quoted by the older authors as an authority for this plant, is, if intended for it, so exaggerated as only to tend to mislead. In the absence of any better authority we have taken our figure from Sieber's Martinique specimen, which quite accords with our specimens from Jamaica and Brazil. — I am quite unable to decide on the place of Mr. Purdie's unarmed specimens; for except that the pinnules are generally more villous and somewhat glandularly so beneath, and the stipes and rachis have no aculei, the Fern is quite that of our *H. repens*.

11. H. *resistens*; "frond ample coriaceous hispidulous on the nerves and veins discoloured oblong the apex attenuated

subtripinnate or tripinnato-pinnatifid the apex more simple, primary pinnæ remote shortly petiolate subopposite divergenti-patent oblong attenuated with an upward curvature, secondary rather remote subsessile divergent from a broader base oblong attenuated slightly curved, tertiary approximate decurrent from the adnate base shortly oblong obtuse pinnatifid, segments falcato-ovate obtuse sparingly crenate or with the pinnules sinuated the lobes suborbiculate, sori large situated in the upper base of the lacinia solitary in the sinus rarely two, the second on the opposite side of the sinus, indusium marginal herbaceous, the costæ beneath convex yellowish, sulcate above and together with the stout rachises and short or moderately elongated stipes purple-brown viscosely hispid, rhizoma creeping squarrosely piloso-paleaceous, scales of a rusty colour." *Kze.* — Cheilanthes resistens, *Kunze, in Linnæa*, xvii. *p.* 275.

Hab. Neilgherries (*Kunze*). — Instead of the copious specific character occupying just half a page of the 'Linnæa,' we wish the able author could have given us a figure, which would have been far more intelligible. We are not, however at a loss for the affinities of this (if it be really distinct). "It comes near" he says "to the western *Cheilanthes repens*, Kaulf.: but differs in the stouter rachises, of a purplish brown colour, not aculeolate, but glandularly or viscidly hispid; in the more coriaceous frond, in the distinctly crenato-serrated pinnules, and the herbaceous indusium."

12. H. *parallelogramma;* frond ample (10—20 feet long) nearly glabrous glossy bi- scarcely tri-pinnate subcoriaceous yellow-brown when dry, primary pinnæ ovate acuminate, secondary sessile or nearly so narrow oblong much acuminated subfalcate closely pinnated at the base (in some) the rest closely pinnatifid, pinnules and lobes adnate parallelogram, fertile ones sinuato-lobate at the margin the sinuses soriferous, involucres semilunate hard coriaceous, stipes and rachis tawny brown rough with minute points scarcely aculeolate. (Tab. LXXVIII. A.)—Cheilanthes parallelogramma, *Kze. in Linnæa*, ix. *p.* 83.

Hab. Woody mountains of Pampayaco, Peru, *Poeppig* (*in Herb. nostr.*) Bamboo-grounds, rare, Tovar, Columbia, *Moritz*, (*Herb. Sonder, n.* 338). —My specimen of this from Dr. Poeppig had, evidently by mistake, a label with the name "*Dicksonia erosa*, Kze." attached to it: a Fern found by that author in the same country. The present is well described by Kunze in the volume of the 'Linnæa' above quoted. He justly observes "Similis *C. repenti*, Kaulf., sed abunde differt." It is the most coriaceous and glossy in its frond of any species of *Hypolepis* I know: the nerves of the pinnules are strong and prominent beneath: the texture thick and opaque. Our figure gives an excellent representation of a perfect pinna in the upper part of the plant: below, where the pinnules are again

divided, they are more acute and acuminate. Kunze and Moritz and Poeppig describe the plant as attaining a length of 20 feet! The fine specimen for which I am indebted to Mr. Sonder is 8 feet long.

13. H. *nigrescens*, Hook.; fronds ample straggling submembranaceous 3-4-pinnate glabrous brownish black when dry opaque, primary pinnæ distant often opposite very patent ovate acuminate, secondary and tertiary pinnæ rather short oblong moderately acuminated, ultimate pinnules or segments oblong obtuse pinnatifid, lobes oval obtuse entire bearing a small single sorus on the anterior margin, involucres very small squamiform, stipes and principal rachis flexuose glabrous polished dark brown aculeated. (Tab. XC. C.) H. repens, *J. Sm. Enum. Fil. Philip. in Hook. Journ. Bot.* iii. *p.* 404.

Hab. Jamaica, *Wilson, Wiles, Purdie, (Herb. Hook. et J. Sm.)* Caracas, *Linden, n. 5 and 6.* Luzon, *Cuming, n.* 271.—In words or even in a small figure it is scarcely possible to define the characteristic distinctions of this plant, which in many respects resembles *H. repens.* Mr. J. Smith indeed published the Philippine Island plant as such, and stated that it exactly accorded with the plant of that name from Jamaica. This is so far true that he rightly considered the plant of Cuming identical with what he and I independently of each other had considered the *H. repens;* that is, a Jamaica *Hypolepis* which accorded with the ordinary description of the *H. repens.* As already stated, however, I have adopted another form of *Hypolepis*, viz., that of Sieber and Kaulfuss, as the true *H. repens;* and the present species is at once, by the eye, distinguishable from that, by its more lax habit, more membranaceous texture, shorter pinnæ, and much shorter ultimate pinnules, with fewer and smaller fructifications. The aculeated stipes and rachis are the same in both.

14. H. *anthriscifolia*, Pr.; fronds ample tripinnate hairy on the midrib and veins beneath tender green membranaceous, primary pinnæ oblong ovate acuminate, secondary ones broad oblong acuminate, pinnules linear-oblong subfalcate deeply pinnatifid, lobes small uniform entire or one- or two-toothed bearing a solitary sorus in the inner margin, involucres small squamiform, stipes and rachis rich yellow-brown glabrous asperulous. (Tab. XCV. A.) *Presl, Tent. Pterid. p.* 162. Cheilanthes anthriscifolia, *Willd. Sp. Pl.* v. *p.* 461. Lonchitis anthriscifolia, *Bory, MSS.* Dicksonia, *Kaulf. Enum. Fil. p.* 227, *et Boj. Hort. Maur. p.* 409. Cheilanthes commutata, *Kze. in Linnæa*, x. *p.* 542, (according to Drége's specimen). Ch. sparsisora, "*Schrad. in Goet. gel. Anz.* 1818, *p.* 918." *Kze. in Linnæa*, x. *p.* 542.

Hab. Woods in Bourbon, *Bory, Carmichael.* Mauritius, *Bojer, Telfair.* S. Africa, *Villette, Miller, Dr. Alexander, Drége, Zeyher, n.* 4633.—A very elegant and delicate species, the pinnæ and pinnules divided and cut with great regularity. I have the good fortune to possess specimens from Bourbon, gathered there by Capt. Carmichael. The Mauritius specimens are

identical therewith, and I am certain that those from the Cape here adduced, and which have been taken up by Kunze under the name of *Cheilanthes commutata*, are in no way different. I bring hither the *Cheilanthes sparsisora* of Schrader, in consequence of the remark of Kunze in the 'Linnæa' above quoted, "Sequenti (his *Ch. commutata*—our *Hyp. anthriscifolia*) omnino similis videtur."

15. H. *elata*, Pr.; "frond triangular (triplicato)-quadri-pinnato-pinnatifid tender membranaceous, pinnæ and primary pinnules petiolate subalternate very remote erecto-patent and as well as the secondary ones subsessile ovato-lanceolate very acuminate, tertiary ones oblong obtuse inciso-pinnatifid or sinuated on each side slightly clothed with whitish hairs, sori and true involucres semiorbiculate situated in the sinus of the laciniæ, stipes elongated and as well as the rachis flexuose purple clothed with reddish chaffy hairs and rough." Cheilanthes elata, *Kze. in Linnæa*, x. p. 542. Hypolepis elata, *Pr.*

Hab. South Africa, in woods at Koratra, *Drége*, (*in Herb. nostr.*)—"*C. Bergiana* differs in the pinnæ and pinnules not being acuminated, in the segments being obliquely obovate and stipes short. *C. sparsisora*, Schrad., according to the very short diagnosis, has the frond less divided, the segments nearly inciso-serrate: *C. commutata* has the involucres fixed near the sinus, &c."—Our own specimen from Drége is so withered and badly preserved that it would be difficult from it to speak of its affinities. As far as can be judged, it is little if at all different from *Hypolepis* (or *Cheilanthes*) *aspera*, Kaulf. sent also by Drége.

16. H. *aspera*, Pr.; "fronds tripinnate, pinnules lanceolate pinnatifido-incised, segments subdentate, rachis asperous, sori solitary at the superior base of the laciniæ, involucres squamiform-subreniform." *Kaulf.*—*Presl, Tent. Pterid. p.* 162. Cheilanthes aspera, *Kaulf. in Linnæa*, vi. *p.* 186. *Kze. in Linnæa*, x. *p.* 544.

Hab. South Africa, *Ecklon*, *Drége*.—If Drége's specimen so named, which I possess, be the same with Ecklon's described by Kaulfuss, the plant scarcely appears to be different from *H. anthriscifolia*: my specimen (a very perfect one) is more rigid and less deeply cut in the ultimate pinnules. Kunze, too, *l. c.*, observes, "a precedente (*C. commutata*, Kze., *C. anthriscifolia*, Schlecht.) satis differre videtur, fronde rigidiori, subcoriacea; pinnis erecto-patentibus laciniis subdentatis, rachique aspera:" and adds "a *C. repente*, Klfs. longius distat." Kaulfuss compares it with *Hypolepis* (Cheilanthes) *repens*, "cui proxima," he says: the latter differing in the obtuse pinnules dilated at the apex in the aculeated rachis and smaller involucres.—Indeed it may be truly said that all the preceding species and some of the following have a *very* close affinity with each other.

17. H. *Bergiana*; fronds tripinnate thin tender-membranaceous semipellucid dark olive-green (when dry) sparsely hirsute on both sides with fulvous hairs, primary pinnæ ovate moderately acuminated, secondary ones oblong rather obtuse,

tertiary ones or pinnules and primary lobes subovate rather oblique entire or pinnatifid, involucres (young) very small situated at the inner margin of a lobe or lobule membranaceous, stipes and primary rachises deep purple-black and as well as the secondary rachises and costa clothed with rusty hairs.—Cheilanthes Bergiana, "*Schlecht. Adumbr. Fil. p.* 51, *(t.* 30, *adhuc inedita).*" *Kunze, in Linnæa,* x. *p.* 541.

Hab. South Africa, *Ecklon, Drége* (*in Herb. nostr.*), *Krebs.* — I regret that, as before observed, my copy of Schlechtendal's 'Adumbratio Filicum' does not extend to p. 51; and I have no access to a description or authentic specimen or figure, unless Drége's specimen marked "Cheilanthes Bergiana, *Schlecht.*" may be considered so. This too I am sorry to say is but the lower portion of a young frond, with a stipes scarcely more than a span long. Judging from this it is distinct from any *Hypolepis* I am acquainted with: in the form of its ultimate lobes and pinnules showing some affinity with *H. repens;* but in little else. Kunze observes, "E distinctissimis generis! Specimina nostra triplicato- tri-s. quadripinnata inter longitudinem 4 et 16 pollicum variant. Caudex repens, radicibus elongatis ramulosis. Quoad reliqua v. descriptionem Schlechtendalianam."

18. H. *rugulosa;* fronds rather large tripinnate rigid coriaceus opaque dark brown when dry slightly hairy beneath, ramification much divaricated, primary pinnæ ovate acuminated, secondary broad-lanceolate moderately acuminated, pinnules oblong rather obtuse deeply pinnatifid the segments entire or more or less incised, sori transversely oblong one on each lobe, the lobe obliquely reflexed forming the involucre becoming thick and hard at the base the apex scariose, stipes and very flexuose primary rachis red-brown glossy slightly viscido-hirsute and rough scarcely aculeolate. — Pteris rugulosa, *La Bill. Sert. Austro-Caledonicum, p.* 6, *t.* 8. *Guillem. Zeph. Tait. p.* 18. Cheilanthes divaricatissima, *Dryand. in Herb. Banks. MSS.*

Hab. Otaheite, *Nelson, Banks* (*in Herb. Banks.*), *D'Urville* (*in Herb. nostr.*); in mountain woods, rare, *Bidwill.* New Caledonia, *Labillardiere.* — A most distinct and well marked species, with a very zigzag main rachis to the frond and the latter beautifully cut into small lobes and teeth. Labillardiere's figure of the entire plant is excellent, not so the magnified figure and the fructification, which latter is represented too much like that of a *Pteris.* Guillemin judged, but from the figure alone, for he does not appear to have seen the plant, that it was not a good *Pteris,* but rather an *Allosorus* or a new genus. It enters nevertheless well into *Hypolepis,* having quite the habit, although the involucre is of a harder and thicker texture at the base than in any other species: its margin however is thin and membranaceous, and is curved down upon a comparatively small number of capsules that form the sorus.

19. H. *Millefolium,* Hook.; frond triangulari-ovate subspithameous coriaceo-membranaceous brown when dry tripin-

nate, primary and secondary pinnæ ovato-lanceolate, tertiary ovate obtuse deeply bipinnatifid, primary segments obovate ultimate segments cuspidato-acute, sori solitary on the inner margin of the ultimate segments, involucres evidently formed of a closely reflexed lacinia covering the sorus, stipes as long as the frond and rachises yellow brown slightly asperulous and as well as the midrib beneath hirsute with rather long crisped jointed hairs, caudex very long creeping naked (not scaly). (TAB. XCV. B.)—Cheilanthes n. sp. *Colenso, MSS. n.* 921.

Hab. Wood of a shaded moist dell, near the summit of Ruahine Mountain range, N. Zealand, and only in that spot, *Rev. W. Colenso.* — None of the present genus has the elegance of the present species, which Mr. Colenso has rightly determined to be new. My largest specimens scarcely exceed a foot in height, and the pinnules are far more deeply and beautifully cut than in *A. anthriscifolia* of Mauritius and the Cape. Here however the fronds are small and rigid and quite opaque. It is most evident in this species that the involucres are formed of the unchanged and reflected laciniæ of the pinnules, bent down upon the sorus. Caudex long and creeping.

20. H. *hostilis*, Pr.; frond triangular-ovate tripinnate, primary pinnæ petiolate remote and as well as the secondary ones sessile alternate patenti-divergent lanceolate, pinnules opposite adnate oblong obtuse inciso-pinnatifid, the segments cuneate at the base subfalcate, secondary rachises margined, primary rachis and stipes aculeolate for much of their length. *Kze. Presl, Tent. Pterid. p.* 162. Cheilanthes hostilis, *Kze. in Linnæa*, vi. *p.* 86.—*β. major;* fronds beneath hirsute with crisped subglandular hairs, stipes and all the rachis aculeolate.

Hab. Hualaga, Upper Peru, *Poeppig.* Cocos Island, Pacific, *Banks.* "Habit almost of *Dicksonia.* Caudex creeping, slender, clothed with brown scales. Stipes a foot and more long, dark brown at the base. Frond a foot or a foot and a half long, slender, dark green. Sori solitary at the base of the laciniæ; involucre spurious, at length evanescent. Allied to *C. repens*, which latter differs in the erecto-patent and much broader divisions of the fronds, and in sori being solitary in the pinnules."—A not very perfect and young, but authentic, specimen of this is in my possession. It has a very close affinity with my *H. nigricans:* but wants the very large and copious aculei of that species: and seems to hold nearly the same relation with that, that my var. *β.* of *H. repens* does with the normal state of that plant.

What I here make var. *β.* is perhaps the more perfect state of this species: the frond is 2—3 feet long, of a rich tawny brown colour, more aculeolate and with the pinnules hairy with crisped and somewhat glandular hairs beneath.

21. H. *Purdieana*, Hook.; fronds rather small ovate-oblong moderately acuminated thick-membranaceous bipinnate hirsute with viscid tawny hairs beneath, pinnæ sessile ovato-

lanceolate rather obtuse the rachis winged, pinnæ oblong obtuse lobed at the margin, the lobes rounded entire or 2—3 toothed each lobe bearing a sorus on its inner margin, involucres moderately small semiorbicular of the texture of the frond slightly scariose at the margin, stipes and main rachis orange-brown asperulous viscidly hairy the latter winged towards the apex. (Tab. XCI. B.)

Hab. Paramo of Ruiz, New Grenada, *Purdie*, (Herb. nostr. and J. Smith). — A distinct and well marked species. Stipes 8 or 9 inches long rather stout, dark brown and glossy at the base, then orange-brown, as is the main rachis, both of which are covered with ferruginous viscid hairs. Frond about as long as the stipes, bipinnate. Primary pinnæ 2 to 2½ inches long, beneath more or less glandularly hairy. Pinnules ½ an inch long and about as much broad. The sori eventually become rather large and force back the distinct but herbaceous involucre which has a pale scariose edge. The secondary rachis is everywhere winged.

(Frond rather small bipinnate).

22. H. *distans;* glabrous small (1 or 1½ foot high), frond ovato-lanceolate glabrous brown when dry generally distantly bipinnate, pinnæ nearly opposite lanceolate acuminate, pinnules sessile lanceolate rigid subcoriaceous rather deeply pinnatifid, lobes ovate spreading, sterile ones inciso-dentate fertile ones slightly toothed, sori in their inner margin solitary, stipes about equal in length with the frond and as well as the rachis and even the midrib (beneath) aculeolate, caudex much creeping densely paleaceo-hirsute. (Tab. XCV. C.) Cheilanthes distans, *Col. MSS. n.* 1782.

Hab. Hokianga, on the west coast of the northern island, and in the valley of the Hutt, N. Zealand, *Rev. W. Colenso.* Northern extremity of the northern island, *Edgerley.*—This is simply bipinnate, and quite unlike any species with which I am acquainted. I willingly adopt Mr. Colenso's MSS. name, expressive of a character common to most of the specimens. The caudex creeps long upon the ground and is densely covered with ferruginous chaffy hairs. Stipes not exceeding a span high, and as well as the rachises and even the underside of the costa aculeolate. Frond from a span to nearly a foot high. Pinnæ very generally opposite or nearly so, spreading at right angles. Sori small, covered by involucres which appear to be inflexed lobes very much recurved of the frond, pale and membranaceous at the edge closely pressed upon the sorus.

(Fronds small deltoid very compound, segments very acute or cuspidate.— Aspidotis, *Nutt.)*

23. H. *Schimperi;* "frond subtriangular acuminate thincoriaceous glabrous concolorous subtripartite bipinnato-pinnatifid more simple at the apex, lower pinnæ ovato-oblong

the rest and the pinnules deeply pinnatifid oblong patent, the segments erecto-patent linear-lanceolate veined mucronato-serrate or incised the apex subtruncate bi- tridentate cuneate at the base, the sinus soriferous, sori and involucres marginal subrotund, stipes quadrangular moderately long, primary and secondary rachis margined furrowed purple quite smooth, caudex creeping weak densely fusco-paleaceous." *Kze.* Cheilanthes (Hypolepis) Schimperi, *Kunze, in Schk. Fil. Suppl. p. 52, t. 26.*

Hab. Abyssinia, *Schimper*, (*n.* 1651). — A very peculiar plant, with the habit, as Kunze well observes, of some small *Davallieæ*. We have an analogue in the following species. The frond is 3—4 inches long, pale green when dry; the stipes rather longer, in my specimens. Kunze's figure is excellent.

24. H. *Californica;* densely tufted from a short scaly creeping root, fronds small triangular slightly acuminate thin-coriaceous glabrous brown when dry deeply-quadripinnate (or more correctly quadripinnatifid) lower pinnæ ovate the rest lanceolate, ultimate pinnules lanceolato-subulate the apices spinulose the sides inciso-serrate, the serratures or lacinulæ sharp pointing upwards soriferous in their sinuses, involucres pale membranaceous reniformi-lunulate rather large directed downwards, stipes dark purple glossy semiterete, rachises furrowed above compressed subulate, caudex creeping rather thick clothed with black-purple scales. (Tab. LXXXVIII. A.) Aspidotis Californica, *Nutt. MSS. in Herb. nostr.* Cheilanthes Coulteri, *Harv. MSS. n.* 820, *in Herb. nostr.*

Hab. Sa. Barbara, California, *Nuttall, Dr. Coulter.*—I have just alluded to the peculiar habit and general appearance of *H. Schimperi.* Our present species, though from a widely different part of the globe, must rank close to that; and Mr. Nuttall is perhaps not far wrong in considering his species deserving of forming a genus (*Aspidotis*) to which, if adopted, *H. Schimperi* must be added. Our plant has almost the same beautifully cut fronds as *Davallia parvula*, Wall. (Hook. et Grev. Ic. Fil. t. 138). The divisions being all nearly the same in diameter; the ramification may rather be considered pinnatifid than pinnate. Our present species is essentially distinguished by the peculiarly acuminated and spinulose points of the ultimate segments. In *H. Schimperi* the involucres arise from the margin and are directed towards the costa: here from the sinus of a nearly erect, or at most erecto-patent serrature or lacinula, and its direction is thence downward towards the base of the pinnule. Stipes a span long: frond about 3 inches.

(Adiantoidea).

25. H. *Capensis;* caudex creeping scaly copiously root-

ing, stipites sparsely tufted 4—6 inches long slender ebeneous shining scaly with long subulate ferruginous scales only at the base, fronds deltoid membranaceous quite glabrous except a few lax scattered long hairs on the rachises 4 inches long bi- tripinnate, pinnules obovate or oval-oblong rarely oblong decurrent and except some next the main rachis coadunate obscurely crenato-dentate sometimes ciliated rarely pinnatifid, sori copious approximate membranaceous semiovate or lunate jagged or ciliated at the margin. (Tab. LXXVII. C.) — Cheilanthes Capensis, *Sw. Syn. Fil. p.* 128. Ch. prætexta, *Kaulf. En. Fil. p.* 212. Adiantum Capense, *Thunb. Prodr. p.* 173. *Kze. in Linnæa*, x. *p.* 530.

Hab. Cape of Good Hope, *Thunberg, Drège, Ecklon, Zeyher, and others.* Algoa Bay, *Forbes.* — A very distinct species, with a decidedly creeping scaly caudex. The fronds membranaceous conspicuously pennivcined, the veins slender forked. The plant dries of an olive-brown colour. We cannot agree with Kunze in placing this in the genus *Adiantum*, though we confess it is not in nature and habit allied to any species of *Hypolepis* or of *Cheilanthes.*

(Fronds with tufted roots, no creeping caudex. Cheilanthoideæ).

26. H. *radiata;* fronds radiate involucrate at the base of the ray, rays lanceolate acuminate pinnate, pinnules horizontal numerous approximate oblong subfalcate auricled at the superior base, sori copious all round the margin and auricle rather small semiorbicular membranaceous, stipites tufted (from a short thick rooting scaly caudex) exactly terete ebeneous, rachises ebeneous grooved above. (Tab. XCI. A.) — Adiantum radiatum, *Linn. Sp. Pl. p.* 1536. *Sw. Syn. Fil. p.* 121. *Willd. Sp. Pl.* v. *p.* 437. *Plum. Fil. t.* 100.

Hab. Tropical America, abundant; West Indian Islands, Brazil, Columbia, central America, Mexico, Peru: from various collectors. — Extremely variable in size, but very constant to its characters: our smallest specimens are from Peru, Chacapoyas (*Mathews*), and Maynas (*Poeppig*): numerous specimens from 4 inches to a span high: our largest are from Guatemala (*Mr. Skinner*), 2—3 feet long, with fronds 24—26 inches in the spread of the rays. All authors have hitherto placed this plant in *Adiantum:* — Mr. Brown has, a quarter of a century ago, marked the Banksian specimens as belonging to *Cheilanthes:* and Mr. J. Smith, in his 'Genera of Ferns,' under *Adiantum,* observes that "the species of that genus with reniform indusia are distinguished from *Cheilanthes* with a similar indusium, not only by the indusium being sporangiferous, but also by the indusium being produced on the converging apices of two or more venules, whereas the sori of *Cheilanthes* are seated on the apices of single venules, which terminate in the axis of the indusium: hence *Adiantum radiatum*, L., is in accordance with that character a true *Cheilanthes.*" — Agreeably to the view I have taken of *Hypolepis* it will rank here, and distinct as it is from other species it has much in common with the following, *H. pedata.*

27. H. *pedata*, Hook.; fronds glabrous small (4—6 inches long) ternately-divided lower lateral divisions unequally bifid (the lowest and shortest one branched pinnate) middle division and superior branch of the lower division bipinnate, pinnules dimidiato-ovate acute obliquely cuneate at the base auricled at the base above, a few of the lower ones of the principal pinnæ subbipinnate or pinnatifid, sori marginal rather small not copious, involucres membranaceous oblong-reniform, stipes elongated (1—1½ foot long) ebeneous glossy as well as the rachis, which is slightly furrowed on the upper side. (Tab. XCII. A.)

Hab. Jamaica, *Purdie.* — This I consider a perfectly new and very distinct species: in some, indeed in many respects, allied to *H. radiatum*, especially in the full dark green colour when dry of the frond, paler beneath, the opacity of the auricled pinnules, the immersed and (except when held up between the eye and a strong light) obsolete veins, the similar lateral involucres, the same ebeneous stipes and rachises. There is even a disposition to be radiate in the ramification; for the two lowest primary pinnæ are nearly opposite, much longer than the rest; and they at the base send out each a divaricating branch (pedate), forming with the terminal or central primary pinna a deeply 5-angled frond. It is an exceedingly pretty plant, and very constant to its characters in all the numerous specimens I possess.

28. H. *spectabilis*, Link; glabrous, fronds 2 feet or more long broad oblong acuminate submembranaceous bright green (when dry) 3-4-pinnate, primary pinnæ deltoideo-acuminate secondary ones lanceolate ultimate ones subdimidiato-oblong sessile decurrent at the base the upper ones confluent, all nearly entire, sori very small not numerous on both margins fewer on the lower very small squamiform nearly white distinct or sometimes confluent, stipes elongated and as well as the rachises ebeneous glossy. (Tab. LXXXVIII. B.) Cheilanthes spectabilis, *Kaulf. En. Fil. p.* 214. Cheil. Brasiliensis, *Raddi, Fil. Bras. p.* 60, *t.* 75, *f.* 2. Hypolepis, *Presl, Tent. Pterid. p.* 166. Aspidium coniifolium, *Pr.*

Hab. Brazil. Common about Rio. Organ Mountains, *Gardner, n.* 198. Pernambuco, *Swainson.* S. Brazil, *Sellow* (*in Herb. nostr.*) Rio Grande, *Mr. Fox* (*Herb. n.* 123). — Raddi's figure above quoted is a fair representation of the entire plant. A common state of the fructification is as represented at our Tab. LXXXVIII. B., while it must be confessed that other specimens exhibit the involucres more or less confluent, and this plant has perhaps as strong a claim to *Cheilanthes* as to *Hypolepis*. Some of my specimens are nearly 4 feet long, including the almost black glossy stipes. I think it ranks better near *H. radiata* and *H. pedata* than with *Cheilanthes*, as I am disposed to consider the limits of the latter genus.

29. H. *paupercula*; laxly tufted, frond ovato-acuminate

5—8 inches long chartaceo-membranaceous pellucid pale green bi- subtripinnate, pinnules distant elliptical approaching to rhomboid very obtuse at the apex and the base petiolulate deciduous, petiolule short intensely black glossy dilated at the apex and inserted a little within the margin beneath, veins and marginal sori few remote, involucre pale membranaceous subrotund rather large, stipes and rachises dark black-purple glossy slender. (Tab. LXXXVIII. C.) Adiantum pauperculum, *Kze. in Schkh. Fil. Suppl.* ii. *p.* 65, *t.* 127. Cassebeera micromera, '*Hort. Berol.*' *Klotzsch, in Herb. nostr.*

Hab. Province of St. Jago, Cuba, *Linden, n.* 1864.—A very remarkable plant, but assuredly rather referrible to *Hypolepis* or *Cheilanthes* than to *Adiantum*. In age the involucres are often seen spread open, yet not bearing the sori. The shape of the pinnules is very constant, and a great peculiarity, noticed though not represented by Kunze, is the dense black short petiolule to each pinnule, which on careful inspection will be found to be attached to the pinnule a little within the margin, and there articulated: from this petiole the pinnule is easily detached, and the petiole remaining on the rachis is seen to be dilated at the top into a small disk, which is the point of attachment. I know not that this curious species has been found anywhere but in Cuba and by Linden. Some of our specimens are tripinnate, as represented by Kunze.

30. H. *Gardneri*, Hook.; tufted small (3 inches high), fronds oblong-lanceolate pinnate glabrous, pinnæ sessile horizontal herbaceous oblong obtuse subfalcate entire or slightly lobed dimidiato-cuneate at the base and auricled at the base above, sori several approximate marginal extending to the auricle, involucres membranaceous between reniform and semiorbicular rather small, stipes very short (scarcely any) and as well as the rachis glossy purple-black ebeneous. (Tab. XCII. B.)

Hab. Side of a narrow ravine on the summit of the Serra de Natividade, Brazil, *Gardner, n.* 3556. — Perfectly distinct from any other *Hypolepis* or *Cheilanthes*, and the fructification is entirely that of the present genus. Notwithstanding the simply pinnated character of the fronds it must naturally, in the habit and texture of the fronds, auricled pinnæ, and in the position and arrangement of the sori, and in the ebeneous stipes and rachis rank with the two preceding. The roots are tufted, very fibrous. As in *H. radiata* and *H. pedata*, the venation is not visible (save in the young pinnæ) unless held up between the eye and the light, it will then be seen to be pinnated, and that the sorus originates from a single vein. I have seen no other specimens but those of Mr. Gardner above referred to.

Dubious Species.

Hypolepis *Sellowiana*, Klotzsch, in Hook. Herb., does not appear to possess an involucre, on which account I do not describe it here. It is a Brazilian plant, and I know not if Dr. Klotzsch has anywhere published it.

4. CHEILANTHES, *Sw.*

(HOOK. GEN. FIL. TAB. CVI. B.) Cheilanthis Sp., *Sw. et Auct.* Adianti, Allosori, Pteridis, Cassebeeræ, Notholenæ, Hypolepidis Sp., *Auct.*

Sori subglobose, marginal, small, generally upon a lobule or tooth of the margin of the frond which becomes reflexed. *Involucre* usually at first punctiform, semiorbicular or subreniform or oblong, formed of a reflexed tooth or lobule and more or less of the texture of the frond, or membranaceous and diaphanous, entire or jagged or toothed or ciliated, more or less confluent, so as often to be continuous; sometimes its situation is a little intramarginal.—*Tropical or extratropical mostly small* Ferns, *inhabiting dry rocky places, with a tufted* root *or rather short creeping* rhizoma *or* caudex. Fronds *tufted more or less, often densely so, membranaceous, glabrous, or hairy, woolly or more or less scaly, never simple, more or less compound, rarely simply pinnate, bitripinnate or variously pinnatifid,* pinnules *and* segments *generally small, their margins recurved in fructification.* Stipites *and principal* rachises *usually ebeneous (dark purple-black) and glossy.* Veinlets *forked, free, conspicuous or obsolete, their apex bearing a single* sorus.

Vain is the attempt to form any definite character which shall decide the proper limits of this Genus. A glance at the above synonyms will suffice to show the views that different authors entertain respecting it. From *Adiantum* indeed the habit is very different, as well as the position of the sori upon the involucre in *Adiantum;* on the margin of the frond in *Cheilanthes,* (χειλος, margin, and ανθος, a flower). In separating *Hypolepis* from it, I have been induced to refer to that Genus (by no means generally adopted), species which many would retain, and perhaps justly, in *Cheilanthes.* But a much greater difficulty exists in drawing the line of distinction between *Notholena,* on the one hand, and *Pteris* or *Allosorus,* on the other. *Notholena* is characterized by the absence of an involucre; but in the young state of many species the reflexed margin of the pinnule can hardly, if at all, be distinguished from a true involucre: while, in old specimens of some acknowledged species of *Cheilanthes,* the involucre is so forced back by the capsules, and concealed by them, that its presence is not easy to be recognized at all, especially in those species where the involucre is of the same texture as the frond. Then with regard to *Pteris* and *Allosorus,* it is quite certain that where the involucres of *Cheilanthes* are confluent, as is so frequently the case (not so in *true Hypolepis*) and continuous, the fructification to all appearance is that of *Pteris* and *Allosorus.* It is true that in most cases the specimen, in some of the pinnules, does exhibit free and punctiform involucres, (as we have observed of some of the *Hypolepis* genus): but there are numerous other cases of species, referred

to *Cheilanthes*, where all the involucres are continuous. Generally speaking, the less the margins of the pinnules are lobed or divided, the more continuous and Pteroid are the involucres. The difficulties above stated are well and briefly noticed by Presl. "Sori demum confluentes vel subcontinui, aut *Pteridi* aut *Allosoro* subsimiles. In quibusdam *Cheilanthis* speciebus, *e. g.* in *C. microphylla*, *C. odora*, et cæt., indusium tam angustum observatum, ut nonnunquam vix adesse videatur; tales species, si sori confluxi marginem frondis undique occupant, *Notholenæ* simulant." Removing several species of original *Cheilanthes* to *Cassebeera* does not seem to me to lessen the difficulty of defining *Cheilanthes;* and assuredly in natural habit they have nothing to do with the original *Cassebeera.*—I find it vain to attempt to form any well-defined groupes of the species of *Cheilanthes.* The ramification is very variable on the same or different specimens of a species: and those four groupes here given must be accepted as merely provisional.

(Fronds simply pinnate).

1. Ch. *micropteris*, Sw.; small, everywhere clothed with glandular hairs, caudex horizontal scaly, roots cæspitose wiry fibrous, stipites short densely crowded from one point ebeneous glossy copiously rufo-paleaceous at the base, fronds linear 3—4 inches long pinnated, pinnæ alternate ovate or subrotund crenate at the base obscurely toothed or lobate convex on the upper surface, involucres formed of the margin of the lobes 3—5 on each pinnule often confluent convex much inflected. — *Sw. Syn. Fil. pp.* 126 *et* 324, *t.* 3, *f.* 5. *Willd. Sp. Pl.* v. *p.* 455.

Hab. Pelileo, Quito, (*Swartz*). Brazil, *Sellow*, (*Klotzsch, in Herb. nostr.*) Sierra do Tondil, Argentine republic, *Tweedie.* — It would be a great boon to the students of Ferns, if the species of Ferns were in general as distinct as the one now under consideration. It is from a finger's length to scarcely a span high, the stipites densely tufted upon a short thick horizontal scaly caudex, which sends down numerous wiry fibrous roots. The short stipes and simply pinnated frond as well as the rachis are glandularly hairy: the pinnules are small, generally deflexed, convex, crenated or lobate, the teeth or lobes of the crenatures are recurved upon the under surface of the frond and constitute the involucres. Cavanilles is perhaps the first botanist who was acquainted with this species, and he sent it to Swartz under the MSS. name of *Pteris microphylla.* It appears to be a rare species. Notwithstanding that it is said to be a native of Quito, and that I possess many excellent collections of plants from thence, I have never received this from that quarter. My only specimens were gathered by Sellow in (South) Brazil, and in the Argentine provinces by Tweedie.

(Pinnæ or pinnules large for the Genus, broad; white and powdery beneath).

2. Ch. *argentea;* small glabrous glossy brown a little scaly below, caudex short thick creeping, stipites tufted, frond cordately 5-angled tripartite white and pulverulent beneath,

each of the three primary divisions pinnatifid, at their base bipinnatifid, the margin crenated, involucres membranaceous brown confluent transversely waved and crenated. *Kze. in Linnæa*, 1850, *p.* 242. Pteris argentea, *Gmel. in Nova Acta Petrop.* xii. *t.* 12, *f.* 2. *Swartz, Syn. Fil. p.* 105 (*not Br.*) *Langsd. et Fisch. Plantes des Voy. Russ., Fil. p.* 19, *t.* 22. Allosorus, *Presl.* Cassebeera, *J. Sm.* Pteris pedata, *var. Linn.*

Hab. Siberia, *Gmelin;* in the fissures of rocks, near the river Katunja Altai, *Ledebour.* Besides from Altai, I possess specimens of this rare and elegant little Fern from Kamtschatka (*Herb. Besser*), from Dahuria (*Fischer*), and from Lake Baikal (*Turczaninow*).—This has the look of a tropical species, with its white powdery surface beneath, and possesses a form so much resembling the West-Indian *Pteris* (Allosorus) *pedata*, Linn., that Linnæus considered it a variety of that species, and published it as such, with the observation, "planta Sibirica minor et subtus nivea, margine ferrugineo." It will be seen by the synonyms what conflicting opinions there are respecting the proper genus of this plant. It ranks naturally near *Ch. farinosa;* but the involucres are always continuous, as in *Pteris* or *Allosorus*, but waved and crenated.

3. Ch. *farinosa*, Kaulf.; roots tufted, stipites more or less elongated ebeneous glossy deciduously scaly, fronds subcoriaceous from a span to a foot long deltoidly lanceolate or lanceolate glabrous white and powdery beneath pinnate the apex pinnatifid acuminate, pinnæ mostly lanceolate pinnatifid the one or two lowermost pair more or less half deltoid bipinnatifid below, involucres brown scariose rounded sometimes confluent and then waved and lobed, the margin entire or toothed and jagged. *Kaulf. Enum. Fil. p.* 212. *Hook. et Grev. Ic. Fil. t.* 134, *excl. Syn. Reliq. Hænk.* (involucres small entire). Pteris farinosa, *Forsk. Fl. Ægypt. Arab. p.* 187. *Vahl, Symb.* iii. *t.* 75. *Swartz, Syn. Fil. p.* 105. Ch. dealbata, *Don, Prodr. Fl. Nep. p.* 16. *Wall. Cat. n.* 71, (*excl. subnum.* 4). *Schimp. in Herb. It. Abyss. n.* 1123. *Kunze, in Linnæa*, xxiv. *p.* 271. Pteris argyrophylla, *Sw. Syn. Fil. p.* 105. Pt. argentea, *Bory.* Pt. decursiva, *Forsk. et Sw.* Cassebeera, *J. Sm.* Allosorus, *Presl.* — β. powdery substance beneath nearly obsolete and usually pale sulphur colour. — γ. small, compact rigid. Ch. rigidula, *Wall. Cat. n.* 2175.

Hab. Arabia, *Forskal.* Abyssinia, near Ser Acaba, *Schimper.* East Indies, plentiful. Nepal and Simla and adjacent region, *Edgeworth, Wallich, Lady Dalhousie.* Mussouree and Nynee Tab, *Dr. T. Thomson.* Almora, 5,000 feet of elevation, *Messrs. Strachey and Winterbottom.* Scinde, *Dr. J. E. Stocks.* Madras Peninsula, *Dr. Wight, n.* 137 *and* 138. Assam and Khasya, *Griffith, T. Lobb.* Neilgherries, *T. Lobb, Sir F. Adam.*

Bourbon, *Bory*. Ceylon, *Gardner, n.* 1168, *Mrs. Genl. Walker*. Phillipine Islands, *Cuming, n.* 235. Java, *Zollinger*.—*β.* Oaxaca, Mexico, *Galeotti, n.* 6551. Bombay and other localities, often growing with var. *α.*—*γ.* Bundydroag, Madras, *Dr. Wight*.—We had two if not more grounds for adopting the specific name of "*farinosa*" for this plant in the 'Icones Filicum,' and not *dealbata* of Mr. G. Don. 1. We believed it to be identical with the *Pteris farinosa* of Förskall: and, 2. There already existed a *Ch. dealbata* of Pursh, a N.-American plant. It is true that Pursh's *dealbata* has been more recently referred to *Notholena*, and Kunze has, in his "Notes on some Ferns of the United States" in 'Silliman's Journal' (July, 1848), said, "I would not have looked for this plant under *Cheilanthes;*"—yet we think *Notholena* treads too closely upon the heels of *Cheilanthes* to make it desirable to increase unnecessarily the number of specific names common to both. In regard to the identity of our *Ch. farinosa* and the *Pteris farinosa*, published in 1775, of Förskal, it is probable that authors differ from us on that ground rather in consequence of the locality (Egypt) than from any positively distinct character traceable in Förskal's description or Vahl's figure: few probably have seen authentic specimens. Kunze however observes ('Linnæa,' xxiv. p. 274), "*Cheilanthes* (Pteris, *Försk.*) *farinosa*, Kaulf.—non Hook. et Grev.—ipso b. auctore in recensione operis laudati jam testante, ab hac nostra differt et adhuc tantum in Arabia et Abyssinia (coll. Schimperiana sub n. 1123) reperta est. Differre imprimis videtur pinnis remotioribus, indusiis contiguis et indumento pulveraceo tenuiore."—We have no access to Kaulfuss' Egyptiaco-Arabian specimen; but we have before us Schimper's Abyssinian species, n. 1123, and we have no hesitation in saying that it is identical with the ordinary East Indian forms above noted. If then Abyssinia and Arabia be considered its western boundary, it may be traced thence easterly, almost uninterruptedly to Java and the Phillipine islands. Species growing in so vast a range may be expected to vary considerably. The same root, from Abyssinia, of Mr. Schimper, has one frond quite white and pulverulent beneath, and another frond with only a faint trace of powdery substance: and this makes it doubtful if our following species (*Ch. rufa*) should be retained as such. No less striking differences occur in the involucres, sometimes rounded and distinct, at other times continuous for a great length of the margin, more or less lobed and cut (rarely entire), and more or less toothed or ciliated. Our *β.* is never quite destitute of powdery substance: and I have received from Mexico (Galeotti) what I cannot in any way distinguish from it. *γ.* is a small and compact form, with segments closely packed and so narrow that the back of the frond seems all sori.—Some specimens of *Ch. farinosa* from Mishmee and Assam have scattered scales all the way up the rachis beneath.

4. Ch. *pulveracea*, Pr.; "fronds triangular-oblong glabrous bipinnatifid, pinnæ subopposite sessile deeply pinnatifid, laciniæ linear-oblong obtuse sinuato-dentate white and farinose beneath, the lower external laciniæ the longest, involucres squamæform, stipes paleaceous at the base." *Presl, Reliq. Hænk.* i. *p.* 64, *(excl. syn.)* Ch. candida, *Mart. et Galeotti, Fil. p.* 73, *t.* 20, *f.* 1, *("excl. f.* 1, *a.") Kunze, in Linnæa,* xviii. *p.* 638. Allosorus pulveraceus, *Presl, Tent. Pterid. p.* 153.

Hab. Mexico, *Hænke.* Rio Grande de Lerma, *Galeotti, n.* 6442. On rocks and walls in the temperate regions of Mexico, *Siebold, in Herb. nostr.* —To this plant Presl brings as synonymes the *Pteris argyrophylla*, Willd., and *Pt. argentea*, Bory, "fide plantæ Borvanæ in Herb. Willd.," which are the same as our *Ch. farinosa*, (Pteris, *Försk.*) Martens and Galeotti, ignorant of Presl's name for it, figure and describe it (not very satisfactorily) under that of *Ch. candida*, and they add the remark, "species proxima *Ch. farinosæ*, Hook. et Grev., sed in hac pinnæ nec pinnatæ nec profundè pinnatifidæ.". We have never seen the ordinary state of *Ch. farinosa*, with the copious pure white purverulent substance beneath, from Mexico: but Mr. J. Smith and myself possess from Galeotti (Oaxaca, n. 6551) what exactly corresponds with our var. *β.* of *Ch. farinosa*: so that there is good reason to believe that that species and its varieties may be found in the New as well as the Old World. Kunze does not allow that the "fig. 1, *a*," belongs to Martens and Galeotti's plant: but it is probably as faithful as most of the other magnified figures of those authors. Presl, in his 'Reliquiæ Hænkeanæ,' observes of this plant, "Habitus *Pteridis*, sed pro specie *Pteridis* non agnosco, quia indusium non continuum sed squamæforme, et tot quantum sori:" yet in his 'Tentamen Pteridilogiæ' he refers it to *Pteris* (Allosorus). Kunze contends for its being a true *Cheilanthes*. The fact is, the involucres resemble those of other species of this genus in being sometimes squamæform and distinct: sometimes combined and continuous.

5. Ch. *rufa*, Don; roots tufted, stipites rather short with few spreading scales and shaggy as is the whole rachis with very copious spreading ferruginous hairs, fronds about a span long ovato-lanceolate subcoriaceous hirsuto-pubescent above, white and pulverulent beneath, the margin densely ferrugineo-hirsute pinnate pinnatifid at the apex, pinnæ oblong very obtuse pinnatifid, the lower ones subovate sub-bipinnatifid, involucres dark brown membranaceous approximate and free or continuous and waved and crisped or lobed and toothed at the margin often quite concealed by the copious ferruginous tomentose shaggy hairs. *Don, Prodr. Fl. Nep. p.* 18. (Tab. XCIX. A.) Ch. farinosa, *var.* vestita, *Wall. Cat. n.* 71, (4).

Hab. Mareko, Nepal, *Dr. Wallich.* Rocks, Mergui, Mishmee and Khasya, *Griffith.* Simla, *Edgeworth.*—In none of the numerous states of *Ch. farinosa*, do I find anything approaching to hairiness: in the present plant, from four different localities, the shaggy copious ferruginous hair, long spreading on the stipes and main rachis, quite crisped and woolly at the margin of the frond, is quite a remarkable feature. The fronds, too, are less divided, in the lower pinnæ especially, but on this character very little dependance can be placed. In other respects, and especially in the white pulverulent under surface (though often quite concealed by the hairiness) the plant resembles some states of *Ch. farinosa.* — Here are, at any rate, tangible characters, if constant. Original specimens, given by Mr. Don to Mr. J. Smith, show this to be intended for his *Ch. rufa*.

(Pinnæ or pinnules large for the Genus, broad; not white or pulverulent nor scaly beneath).

6. Ch. *Dalhousiæ*, Hook.; roots tufted, stipites rather short ebeneous glossy deciduously scaly, fronds about a span long deltoidly lanceolate glabrous on both sides and perfectly free from powdery substance beneath pinnate the apex deeply pinnatifid and acuminate, pinnæ upper ones lanceolate pinnatifid, the rest broader and bipinnatifid, lowest pair very broad at the base with their lowest inferior segments (or pinnules) much longer than the rest, the margin crenated sometimes in the barren portions ciliated, involucres brown scariose reniform close but generally distinct sometimes confluent and then less ciliated but lobed and jagged. (Tab. LXXVIII. B.)

Hab. Simla, *Lady Dalhousie, Mr. Edgeworth.* Mokargari, Kumaon 4500 feet of elevation, *Messrs. Strachey and Winterbottom.*—Did I possess only a solitary specimen of this, or were the specimens any of them mixed up with *Ch. farinosa*, I should have been disposed to consider it a powderless variety of that species: but there is not a trace upon any of my specimens of that pulverulent substance seen more or less copiously upon all true *farinosa*, and these have been found by three different persons at different periods, yet only in two localities. I venture therefore to offer it as distinct. Its fronds are of a thin membranaceous texture, turning pale olive-brown in drying, and the fructifications present nearly the same variations in the involucre that we see in *Ch. farinosa*. It naturally ranks with that species, though here artificially placed in another section.

7. Ch. *pteroides*, Sw.; caudex thick creeping scaly, stipes 1—2 feet long and as well as the rachises (which are woolly at their axils with slender scales) stout ebeneous glossy, frond ample glabrous 1—1½ foot long tripinnate, pinnæ and pinnules distant, the latter petiolulate often an inch long cordate elliptical obtuse crenate opaque brown when dry, involucres copious contiguous yet distinct subrotund membranous brown extending over the whole margin.—(Tab. CI. A.) *Sw. Syn. Fil. p.* 128. *Willd. Sp. Pl.* v. *p.* 455. *Blume, Fil. Jav. p.* 136. Adiantum, *Linn., Thunb.* Cassebeera, *Presl, Tent. Pterid. p.* 155, *t.* 6, *f.* 7. Pteris orbiculata, *Houtt.*

Hab. Cape of Good Hope, abundant, in rocky mountainous places, from 1000—3000 feet of elevation. Summit of Mount Gede, Java, *Blume.*—We have here a Fern very distinct from any other *Cheilanthes*, so distinct, that it needs no elaborate description for distinguishing it; with the true involucres, indeed, of that genus, but with the habit altogether of certain species of *Pteris* or *Allosorus* common at the Cape. The plant has consequently vacillated between *Adiantum* and *Pteris* and *Cassebeera* and *Cheilanthes*, according to the views of respective authors.—An authentic specimen of the Java plant, from Dr. Blume, shows that that is identical with the Cape plant, as are the *Ch. multifida* and *hirta* of Java with those respective plants of South Africa.

(Pinnæ and pinnules as in the preceding group, but densely clothed with imbricated scales).

8. Ch. *squamosa*, Gill.; roots tufted, stipites 1—2 inches long and as well as the general and partial rachis and costa and pinnules beneath densely clothed with and concealed by the copious large ovate acuminate ciliated membranaceous ferruginous scales, fronds 4—5 inches long ovato-lanceolate bipinnate subcoriaceous glabrous and naked above (fringed with the scales beneath), pinnules large oblong sinuato-lobate, involucres submembranaceous narrow continuous. *Gill. in Hook. et Grev. Ic. Fil. tab.* 151.

Hab. Rocks, Cerro del Morro, San Luis, Argentine Republic, *Dr. Gillies.*—A most distinct and well-marked species, which, as far as we know, has never been detected by any botanist save Dr. Gillies. It has no natural affinity with the preceding broad-pinnuled species, nor has it any with the scaly species allied to *Ch. lendigera.*

(Fronds generally decompound, the pinnules small, glabrous or hairy or scaly.—Eucheilanthes).

9. Ch. *fragrans*, Webb et Bert.; small, roots cæspitose, stipites short glossy deep brown bristly with deciduous subulate ferruginous scales, fronds glabrous ovato-lanceolate bipinnate or at the base subtripinnate, primary pinnæ broad-ovate lower ones distant, pinnules (fructiferous) convex on both sides oblong or ovate crenato-lobate, involucres copious small approximate one or more on each lobule their margin toothed or crenate pale and membranaceous often confluent. — *Webb et Berth. Phytogr. Canar. p.* 453 (non Sw.) — Polypodium fragrans, *Linn. Mant.* 2, *p.* 307, (non Sp. Pl. p. 1550). *Desf. Fl. Atl.* ii. *p.* 408, *t.* 257. Pteris acrosticha, *Balb.*—Pteris fragrans, *Lag.*—Adiantum fragrans, *Viv.* Cheilanthes odora, *Sw. Syn. Fil. p.* 127 *et* 327. *Schkuhr, Fil. p.* 115, *t.* 123. Ch. suaveolens, *Sw. Syn. Fil. p.* 127. *Schkuhr, Fil. p.* 116, *tab.* 19, (Adiantum fragrans, on the plate). *Sibth. Fl. Græc. t.* 966. Ch. Maderensis, *Lowe, Nov. Fl. Mad. p.* 6.

Hab. Rocky places throughout the region of the Mediterranean. "Cives est hæc planta" says Mr. Webb, "oræ utriusque sinus ingentis Mediterranei, a Syria (*Labillardière*) ad Hispaniam, unde per Lusitaniam et Maderam Fortunatas attingit." Switzerland is perhaps its most northern locality. Dr. Alexander finds it in Dalmatia. We have to add one very distant locality, viz., Affghanistan, *Mr. Griffith*, n. 13, in herb. nostr.—The student of Ferns is much indebted to Messrs. Webb and Berthelot for determining the proper name and settling the synonymy of this species in their noble work on the Canary-island plants. They observe, "Linnæus plantam nostram sub nomine *Polypodii fragrantis* (Mant. nov. Sp. Plant.), quam secum a Gallia communicavit doctus monachus Gabriel (cui *Sco-*

lopendra Gabrielis, Syst. Nat. vol. i. p. 1063 dicata) optime descripsit. Confusio et specierum perturbationes cum Swartzio, quod rarum, ortæ, qui nomina duo diversa plantæ Linnæanæ, Linnæanum alteri Indicæ, nisi forsan eadem, indidit; planta enim valde polymorpha; utcunque autem erit *Cheilanthi* (Polypodio, *Linn.*) *fragranti* veræ restituendum nomen suum et Swartziana, dum legitima, *Cheilanthes Swartzii* vocanda."—Polymorphous as this species is, it is much less so than most species of the Genus or of the Family: and we can refer to the figures of Schkuhr, both his tab. 19 and 123 (though he considered the two plants as distinct), and to Sibthorpe, and Desfontaines, for faithful representations of the entire plant: but the fructification is nowhere well exhibited. Irregular as is the form of the involucres, and however these may be distinct or combined, it will be observed that while their lower portion or base is evidently formed of the inflexed margin of the frond, green and herbaceous, the rest is a pale membranous dilatation as it were of it.

10. Ch. *tenuifolia*, Sw.; caudex short creeping scaly, stipes elongated rarely scaly, frond submembranaccous glabrous 3—4 inches to a span and more long ovate acuminate or more or less deltoid subtripinnate, ultimate lobes of the primary and secondary divisions the largest more or less pinnatifid, pinnules elliptic oblong or oblong-lanceolate subpinnatifid or crenate with broad blunt teeth, involucres mostly elongated more or less confluent more or less crenated or denticulate sometimes transversely wrinkled, stipes and rachis purple-black, main rachis winged above, secondary and tertiary rachises all with a narrow wing. (Tab. LXXXVII. C.) — *Sw. Syn. Fil. p.* 129 *et* 332. *Schkuhr, Fil. p.* 117, *t.* 125. *Willd. Sp. Pl.* v. *p.* 460. *Br. Prodr. p.* 155. C. rupestris, *Wall. Cat. n.* 67. C. micrantha, *Wall. Cat. n.* 68. Aspidium tenue, *Retz, Obs.* vi. *p.* 39. Pteris humilis, *Forst. Prodr. n.* 421? Trichomanes tenuifolia, *Burm. Ind. p.* 237. Dryopteris campestris, &c., *Rumph. Amb.* vi. *p.* 77, *t.* 34, *f.* 2.

Hab. East Indies (*Swartz*), more especially in the hilly eastern provinces of Bengal. Pundooh Mountains, Sylhet, Tavoy, *Dr. Wallich.* Moulmain and throughout Khasya and Assam, *Griffith, Mrs. Mack.* Madras Peninsula, *Dr. Wight*, (*n.* 136). Mangalor, (*Herb. Hohenacker, n.* 666). Ceylon, *Gardner, n.* 1257, *Mrs. Genl. Walker, Major Champion.* Malay Islands and Peninsula, frequent. Sincapore, *Sir W. Norris, Seemann, n.* 2304, *Dr. Wallich.* Malacca, *Griffith.* Penang, *Lady Dalhousie.* Java, *Blume, Zollinger, Thos. Lobb.* Phillipine Islands, *Cuming, n.* 281. China, *Swartz, Beechey.* N. Holland, Port Jackson and the Tropics, *Brown, Fraser.* Swan River, *Drummond.* Van Diemen's Land, *Mr. Lawrence, Mr. R. Gunn.* New Zealand, Banks' Peninsula, *Dr. Lyall.* Sunk Island, *Mr. MacGillivray.* — A widely distributed *oriental* species of *Cheilanthes*, both in the northern and southern hemisphere, variable in size and outline, but very constant in the general ramification and form of the pinnules, although these latter naturally differ much in form in different parts even of the same plant. Our finest and most perfect specimens are those of Mr. Thos.

Lobb, from Java and Sincapore: and our figure above quoted will give a better idea of the plant than whole pages of description can do.

11. Ch. *Preissiana*, Kze.; "frond coriaceous glabrous short-oblong bipinnato-pinnatifid or tripinnate, pinnæ triangular-oblong inferior ones ascending remote, pinnules or laciniæ from a cuneate base ovate (in young cultivated fronds trapezio-ovate) rather obtuse incised or pinnatifid, sori subcontinuous, involucres at length inciso-laciniate, rachises flexuose and as well as the longish stipes purple-ebeneous paleaceo-villous, rhizoma short horizontal fusco-paleaceous." *Kunze, in Pl. Preiss.* ii. *p.* 112.

Hab. Rocky places, York district, Swan River, *Herb. Preiss. n.* 1308. Island of Bouron, *Labillardière.* New Zealand, *Lesson.*—"Antea," says Kunze, *l. c.*, "hanc plantam *Cheilanthis ambiguæ*, Rich. (Voy. de l'Astrol. Bot. i. p. 83) credidi; sed nunc filicem eandem Lessonianam, quam ex amicæ manu Mérattii acceperam, a Richardo neglectam, et *Ch. ambiguam* vix veram generis speciem esse vero similius mihi videtur. Hanc nondum vidi. Nostra habitu *Ch. tenuifoliæ*, Sw., haud absimilis; differt rachibus pilosis, stipite longiori et soris continuis." *Kze. l. c.*—I regret to say that rich as is my herbarium in Swan River Ferns, and in those from New Zealand, I do not find any that I can satisfactorily refer to Kunze's *Ch. Preissiana.* The *Cheilanthes ambigua*, Rich., I have had reason to suppose might be possibly *Hypolepis tenuifolia*, Bernhardi, and of this work, or else a *Polypodium* with the habit of *Hypolepis* (Pol. viscosum, *Spreng.*— P. rugulosum, *Br. ?*). The comparisons drawn by Kunze make it more difficult to comprehend the species in question.

12. Ch. *Sieberi*, Kze.; caudex creeping setaceo-paleaceous, stipites 2—6 inches long and as well as the rachises ebeneous, fronds quite glabrous subcoriaceous linear-oblong erect rigid bi-tripinnate, primary ones short pointing upwards lower ones petiolate subtriangular acuminate, pinnules oblong decurrent lower ones inciso-pinnatifid upper ones entire or sinuated the margins much recurved especially when dry, sori punctiform and semiorbicular or more or less combined and continuous, the edge pale and membranaceous toothed. (Tab. XCVII. B.) *Kunze, Ind. Sem. Hort. Lips. an.* 1839, *et in Plant. Preiss.* ii. *p.* 112. Ch. tenuifolia, *Sieb. Syn. Fil. n.* 116. *Fl. Mixt. n.* 250. *Link, Fil. Sp. Hort. Berol. p.* 64, *(excl. syn.)*

Hab. N. Holland; Sydney, *Sieber, Fraser.* Subtropical interior, *Col. Mitchell.* Endeavour River, *Allan Cunningham.* Swan River, *Drummond, Preiss.*—New Zealand, northern island, *Mr. Colenso, J. D. Hooker, Dr. Logan.* Middle island, Akaroa, *Raoul.* Houraki Gulf, *Dr. Lyall.*—I retain this, with much hesitation, as a species distinct from *Ch. tenuifolia:* true indeed there are some specimens which in the narrow fronds and erect rigid habit are much at variance with the ordinary form of *tenuifolia;*

but then there are intermediate forms which seem to combine them. I cannot agree with Kunze in saying of it, "a *Ch. tenuifolia*, Sw., abunde differt *fronde membranacea:*" for our specimens are, except those in a very young state, more rigid. That author also notices its affinity with *Ch. rupestris*, Wall.,—which latter is true *tenuifolia*.

13. Ch. *microphylla*, Sw.; caudex subrepent, stipes rather short and rachises deciduously ferrugineo-pubescent or hirsute, fronds lanceolate pubescent or glabrous elongate lanceolate bi- rarely subtripinnate, pinnæ lanceolate, pinnules oblong obtuse entire or more or less crenate or pinnatifid, involucres copious rounded or elongated frequently much confluent.—*Sw. Syn. Fil. p.* 127. *Willd. Sp. Pl.* v. *p.* 458. Ch. micromera, *Link, Hort. Berol.* ii. *p.* 36. *Link, Sp. Fil. Hort. Berol. p.* 64, *(fide Kze.)* Ch. pubescens, *H. B. K. (fide Schlecht.)* Cassebeera, *J. Sm.* Adiantum microphyllum, *Sw. Fil. Ind. Occ.* iii. *p.* 1713. Adiantum nigrum, &c., *Sloane, Jam. Hist.* i. *p.* 93, *t.* 13, *f.* 2. Lonchitis minima, &c., *Plum. Fil. p.* 44, *t.* 58.

Hab. West Indian Islands generally, (*Swartz*). Jamaica, abundant, *M'Fadyen, Hartweg, n.* 1581, *Wilson, Purdie.* Cuba, *B. D. Greene, Esq.* Mexico, *Karwinski, Galeotti, n.* 6557, *and* 6564, *Dr. Coulter* (Rio del Monte, small, pinnules few, broad, *n.* 1678). Sierra Madre, N.W. Mexico, *Seemann, n.* 1931. New Mexico, El Paso, *C. Wright, n.* 823, *(small).* Columbia, *Moritz.* Venezuela, *Linden, n.* 842. Peru, *Mathews, n.* 3297. Valley of the Andes of Peru, 6000 feet, *Dr Jameson.* Punta of St. Elena, Salto and Panama, *Tweedie.*—To say that this is a variable species, is only what may be said of almost all Ferns: and I do not see that any the most minute description can meet the difficulties of the case: for they rather tend to confuse and to mislead. The general form of the frond is tolerably well expressed in Plumier, though on his usually exaggerated scale: but there are some states that bring our species into near relationship with *Ch. tenuifolia:* our largest specimens on the other hand have an affinity with some states of *Hypolepis spectabilis.* The involucres are particularly variable, sometimes short and orbicular, at other times linear and continuous, approaching, as so many of these plants do, to *Allosorus:*—this depends doubtless much on the entireness or indentation of the pinnules. Our El Paso specimens from Mr. C. Wright, are small, quite glabrous (not from age), and the caudex is decidedly creeping. They may prove a different species. Galeotti's *n.* 6564, though rather small, has the pinnules larger than usual. Mr. Seemann's from Sierra Madre, has some fronds with the involucres continuous; others with the sori all small and distinct.

14. Ch. *Tweediana*, Hook.; caudex a good deal creeping horizontally, clothed with subulate brown bristly scales, stipites scattered on the caudex short in proportion to the frond slender ebeneous a little scaly towards the base, fronds quite glabrous a span to a foot or 1½ foot long linear-oblong bipinnate, pinnæ short distant oblong or ovate, pinnules membra-

naceous dark green distant oblong but subcordate at the base and the lower ones shortly stipitate (only 2 or 3 of the terminal ones decurrent and confluent) lobato-pinnatifid or crenato-lobate the lobes soriferous, involucres semiorbicular 1—3 on each lobe more or less combined their edges pale submembranaceous crenate. (Tab. XCVI. B.)

Hab. River Parana, S. Brazil, *Tweedie*.—I cannot refer this to any described species. In habit it approaches very small specimens of our *Hypolepis spectabilis*, and might perhaps have been placed near it in the same questionable genus; in some repects also to states of *Ch. microphylla*:—but the ramification is much more simple and uniform. Our tallest specimen (and it is only a *part* of a frond, 17 inches long) is not broader than our specimens which are less than a span long, and all are alike bipinnate. The lower pinnules are shortly petiolate or stipitate. The caudex creeps considerably, and is scarcely thicker than a crow-quill. — I have received this plant only from Mr. Tweedie.

15. Ch. *Seemanni*, Hook.; roots tufted, stipites 3—6 inches in length scaly below with black subulate scales and as well as the general and partial rachis ebeneous-purple, fronds glabrous submembranaceous dark green about equal in length to the stipes oblong-lanceolate bipinnate, primary pinnæ rather distant oblong acuminate patent, pinnules often quite opposite horizontally patent oblong sessile and decurrent so as to form a narrow wing on the rachis lobato-pinnatifid, lobes or segments equal in size generally one or two more on the upper margin, all soriferous, involucres one on each lobe semiorbicular membranaceous pale brown all free and distinct. (Tab. XCVII. A.)

Hab. Sierra Madre, N.W. Mexico, *Seemann*:—came mixed with *n.* 1931 (*Ch. microphylla*, Sw.) — At first sight this resembles *Ch. Tweediana*, but the pinnæ will be found very different, and the deep segments or lobules of the pinnules, more in number on the upper margin than on the lower; each lobule bears a distinct sorus at its apex, covered while young with a semiorbicular membranaceous and diaphanous involucre. Although mixed with *Ch. microphylla*, there is no difficulty in separating the one from the other.

16. Ch. *Moritziana*, Kze.; stipes 5—6 inches long ebeneous glossy ferrugineo-paleaceous at the base, frond ovato-lanceolate acuminate a span to 10 inches long firm rigid yet somewhat membranaceous dark green glabrous 3—4-pinnate or tripinnato-pinnatifid, the ultimate pinnules oblong-cuneate slightly lobed or toothed, partial and universal rachises pubescenti-scabrous, involucres small generally formed of the involute apex of a single lobe rarely subconfluent. (Tab. XCIX. B.) *Kze. in Linnæa*, 1850. *p.* 244 *et* 307. C. elongata, *Kl. MSS.*

et Pl. Exsicc. (not Willd.). C. microphylla,* *Klotzsch, in Linnæa*, xx. *p.* 337, *(excl. syn.* C. Klotzschiana, *Kze, quæ* Gymnogramma flexicaulis, *Kl.) Kze.*

Hab. Venezuela, and in Mexico, *Schiede, n.* 800.—Our figure and specific character are taken from specimens kindly sent to us by Dr. Sonder, gathered at La Guayra by Moritz, (*Coll. III. n.* 263). It is a very elegant and we believe very distinct species, better deserving the name of *microphylla* than the *Ch. microphylla*, Sw., with which it has been compared, and which Kunze says differs "fronde basi haud dilatata, semper bipinnata, pinnis ultimis majoribus, rachi primaria valida stipiteque brevi dense rufo-paleaceis." To us its nearest affinity seems to be *Ch. tenuifolia;* but it is much more delicate in all its parts: the primary pinnæ are more numerous, more approximate, and the ultimate pinnules and lobes are more cuneate at their base. Our figures will show the differences better than words can do.

17. Ch. *elongata.* Willd. Herb.; "fronds bipinnate, lower pinnules sinuato-pinnatifid obtuse glabrous, indusium obsolete subcontinuous." *Kaulf. En. p.* 213, *(not Kl. MSS.)* C. Linkiana, *Kze.* C. microphylla, *Lk. (not Sw.) Kunze, in Linnæa*, xxiii. *p.* 213.

Hab. W. Indies, Hispaniola, (*Kaulf.*)—"Sori contiguous confluent. Involucres obsolete, sub-continuous and ciliated."—Such is all the description we have of Willdenow's *Ch. elongata.* But from some of Kunze's references I judge it may be placed near *Ch. Moritziana*, Kze.

18. Ch. *obtusata*, Pr.; "fronds oblong glabrous bipinnatifid, pinnæ sessile subopposite oblong-lanceolate obtuse deeply pinnatifid, laciniæ ovato-oblong obtuse, lower ones inciso-crenate, involucres dentiform, rachis and costæ villous beneath, stipes flexuose, caudex creeping paleaceo-villous." *Presl, Reliq. Hænk. p.* 6, *t.* 11, *f.* 1. *Tent. Pterid. p.* 160.

Hab. Mountains of Peru, *Hænke.*—"Ab affini *Ch. microphylla*, Sw., differt fronde bipinnatifida, laciniis infimis inciso-crenatis, rhachi costaque villosis, caudice repente villoso." I have seen no *Cheilanthes* like this from the Peruvian Andes. The figure shows no analysis, and nothing is said of the fructification.

19. Ch. *crenata*, Kze.; "frond linear-oblong pinnato-pinnatifid glandulosely hairy, pinnæ subopposite sessile ovato-oblong, segments ovate or shortly oblong truncate ultimate ones confluent crenate subincised, involucres at length obsolete, rachis pale and as well as the stipes short brown and paleaceous at the base glandularly rough." *Kunze, in Linnæa*, ix. *p.* 84.

Habt Rocky places, Huanuco, Peru, elevation 6,200 feet, *Poeppig.*—"*Cheilanthis* species fallax, in juniori planta recognescenda. Specimina

adultiora ob indusia spuria fere explanata *Polypodii* characteres præ se ferunt." — I place this, with which I am unacquainted, near *Ch. obtusata*, Presl, in consequence of the following additional remark of Kunze. "Magnitudo et habitu fere *Ch. obtusatæ*, Pr., quæ vero nostra differt, laciniis crenato-incisis et indumento glanduloso." — In another place Kunze speaks of his *Ch. crenata* as synonymous with *Ch. elegans*, when he says ('Linnæa,' xxiv. p. 275), under *Ch. bullata*, "habitu fere *Ch. elegantis*, Desv., s. *crenatæ* meæ."

20. Ch. *Wrightii*, Hook.; small nearly glabrous, caudex creeping branched scaly about as thick as a crow-quill, stipites rather distant 2—3 inches long and as well as the main rachis brown-ebeneous grooved on one side sparsely hairy with slender spreading hairs, frond about equal in length with the stipes bi- scarcely tripinnate quite glabrous rigid subcoriaceous dark green above pale beneath, primary pinnæ subovate in circumscription rather distant especially the lower pairs which are nearly opposite, pinnules oblong more or less decurrent upper ones confluent pinnatifid with smallish lobes, the smaller lobes with the apex revolute and forming squamæform but close-placed distinct involucres the larger ones with the sides (generally) involute resembling confluent or more or less elongated involucres. (Tab. CX. A.)

Hab. Collected in the expediton from Western Texas to El Paso, New Mexico, May—October, 1849, *Charles Wright*, *n.* 823.—A small and very pretty, and as far as I can judge, very distinct species, somewhat allied in its fructifications to the East Indian *Ch. varians* of Dr. Wallich, but very much smaller and with ample distinguishing characters from that. *Ch. Alabamensis* is a much larger plant, more regular in its ramification and very uniform in the continuous involucres, as may be seen by the figures. The present is, in its squamiform involucres, much more truly a *Cheilanthes*.

21. Ch. *subvillosa*, Hook.; stipes shining brown slightly scaly, frond broad-lanceolate or ovate pinnate thin submembranaceous glabrous above, soft villous about the rachises beneath, pinnæ all obtuse upper ones lanceolate the rest broad deltoid-lanceolate or ovate pinnatifid, rarely the lowest laciniæ again pinnatifid, the margin nearly entire, involucres of nearly the same colour and texture as the frond sometimes subrotund and free mostly continuous lobed and crenated; main rachis especially above villous. (Tab. XCVIII. B.)

Hab. Western Himalaya, *Mr. Edgeworth*. — With a good deal the aspect of our *Ch. Dalhousiæ*, the present plant is nevertheless very distinct and perhaps ought to be referred rather to *Allosorus* (Presl) than to *Cheilanthes*; for the involucre is more generally continuous than in separate scales, though so lobed and crenate that it quite vacillates between the two genera. I have seen nothing corresponding with it in any other collection. Our specimens have unfortunately no root, and the stipes of all is broken.

The figures represent a medium sample. In one of our specimens the pinnæ are more, and in another less, divided than is here represented.

22. Ch. *bullosa*, Kze.; "rhizoma short thick obliquely descending," stipites 6—8 inches long terete asperous at the base and as well as the rachis and stout prominent partial rachis beneath which extends to the apex of the pinnæ deep glossy ebeneous, frond rigid coriaceous glabrous (dark olive-brown when dry) oblong-lanceolate opaque above and there under the microscope as it were minutely granulated pinnato-pinnatifid 6—8 inches long, pinnæ rather distant nearly opposite the lower ones sometimes sub-bipinnate ovato-oblong patent deeply pinnatifid the lobes linear crenate on the lowest inferior ones often again pinnatifid singularly bullate on the upper side in consequence of the sunken costa and veins (the spaces between them thus being convex), the primary lobes of the pinnæ are rather distant, so that the pinnæ may almost be said to be pinnate with a winged rachis, the margins of the lobes and teeth of the crenatures are much reflexed and form semiorbicular involucres pale at the edge which become united and more or less continuous and slightly erose at the margin in age becoming more membranous. (Tab. XCVI. A.) *Kunze in Linnæa*, xxiv. *p.* 274.

Hab. Neilgherry Hills, *Schmid, Koch (Kunze), Dr. Gideon Thomson.* —"Species valde insignis," as Professor Kunze well observes. That able author compares it with "*Ch. elegans*, Desv. (*Ch. crenata* (Kze.), in habit; but with *Ch. pruinata* and *Mysurensis* in characters. It is however very distinct from any of them and from every species. The stipes and main and partial rachis are stout, glossy purple-black, the former asperous at the base; the partial rachis singularly stout and prominent beneath, and its glossy black colour extends to the apex of the pinnæ. The upper side of the frond is remarkable for its very opaque surface, apparently caused by minute granulations there, and the costa or partial rachis and veins are much sunk, so as to give a bullate appearance, which suggested the specific name given by Kunze.

23. Ch. *pygmæa*, Kl.; "frond ovate bipinnato-pinnatifid, pinnules obovato-subtrapeziform obtuse inferior ones pinnatifid, rachises and stipes densely ferrugineo-villose." *Kl. in Linnæa*, xx. *p.* 338.

Hab. Mexico, *E. Aschenborn*, *n.* 563, (Klotzsch).—"Rhizoma ascending, slender, pale ferrugineo-villous. Fronds 3—4 inches long, subflexuose. Stipites slender, at length glabrous, becoming black. Pinnæ lanceolate, obtuse, 5 lines long. Pinnules obliquely subtrapeziform, pinnatifid, obtuse, sparingly pilose beneath, 1½ line long, shortly petiolate." *Kl.* This is placed next *Ch. microphylla* in Dr. Klotzsch's Filices of the 'Flora der Æquinoctial-Gegenden der neuen Welt;' but I know not whether we are thence to infer that its affinity is with that species. No further remarks, than the above, are given.

24. Ch. *varians;* root tufted, stipites 4—6 inches long slender ebeneous glossy plane and margined on the upper side obsoletely setoso-paleaceous, fronds submembranaceous glabrous about a span long the pinnatifid apex acuminated, pinnated above bipinnated below, primary pinnæ distant spreading or a little curved upwards sessile, superior ones lanceolate acuminate sinuato-pinnatifid at their base and somewhat auricled at the upper base, lower ones deltoid acuminate pinnate at their base pinnatifid acuminated (caudate) in the upper half, pinnules lanceolate acuminate or acute pinnatifid below, the lowest inferior pinnæ the longest. (Tab. CIII. A.) Pteris varians, *Wall. Cat. n.* 86. Pt. cæspitosa, *Ejusd. Cat. n.* 90. Cheilanthes tenuifolia, *J. Smith, in Hook. Lond. Journ. Bot.* iii. *p.* 404, (*n.* "408," from Luzon only).

Hab. Mountains of Ava, and of Sylhet (*De Sylva*), *Dr. Wallich.* Mergui, Assam, (*Simons, n.* 262). Khasya, *Griffith.* Moulmaine, *T. Lobb, n.* 391. Luzon, *Cuming, n.* 408.—Though by no means inclined to unite this, with Mr. J. Smith, to *Cheilanthes tenuifolia,* I am not indisposed to refer it to the same Genus, though it is very questionable whether it should be placed in *Cheilanthes* or in *Pteris,* as our friend Dr. Wallich has done: and if this latter distinguished and zealous botanist were to ask a reason for doing so, I could only say that the fructification is in part *Cheilanthoid* and in part *Pteroid.* I am sure if Mr. J. Smith had possessed our numerous specimens from Eastern Bengal, and observed their uniformity, he would not have referred it to any described species of *Cheilanthes.* Dr. Wallich's appropriate name of *varians* refers to the varying form of the pinnæ on the same individual plant; the upper ones are simple and scarcely even lobed, the middle ones are deeply pinnatifid at their base, while the lowest ones are pinnate at their base. The *Pt. cæspitosa,* Wall., offers no point of difference from *Pt. varians,* Wall.

25. Ch. *Alabamensis,* Kze.; caudex creeping clothed with dense glossy brown woolly scales, stipites 4—5 inches long deep glossy black as well as the main and lower part of the secondary rachis which are hairy on one side, fronds quite glabrous subcoriaceous about as long as the stipes broad lanceolate acuminate pinnated pinnatifid above below bipinnate, primary pinnæ approximate ovate-lanceolate acuminate, pinnules or lobes of the upper pinnæ lanceolate rather acute entire or auricled or lobate at the base, pinnules of the lowermost pinnæ almost again pinnate, involucres submembranaceous mostly continuous all round the lobes and pinnules the edges slightly crose. (Tab. CIII. B.) *Kze. in Silliman's Journ.* 1848, *p.* 87. *Linnæa,* 1850, *p.* 242. Pteris Alabamensis, *Buckley, in Sill. Journ.* 1843, *p.* 177. Pteris gracilis, *Ruyel, Coll. Pl. Am. (not Kaulf.)*

Hab. Southern United States, growing in tufts on limestone rocks, banks of the Tenessee river, Alabama, *Mr. Buckley.* Broad river, Tenessee, *Rugel.* Capville, Upper Georgia, *Herb. Shuttleworth.*—Notwithstanding the remark of Professor Kunze, that this is a very distinct species, to me it appears to be too nearly allied to some of the forms of *Ch. microphylla;* the form, I mean, having the most compact and acute pinnules, and with continuous involucres. Indeed Kunze himself says "it resembles *Ch. micromera*, Sw., and my *Ch. Linkiana*, (Ch. micromera, *Link*)." This *Ch. micromera* of Link, Kunze has since referred to *Ch. microphylla:* and we may, in this form, conceive that *Ch. microphylla* has attained its northern limits in the Southern States of N. America.

26. Ch. *Moluccana*, Bl.; "frond bipinnate subcoriaceous and as well as the rachis and stipes pubescent, pinnules obovate obtuse crenulate confluent above, sori continuous, involucres obsoleto, stipes and rachis black-purple." *Blume, En. Fil. Jav. p.* 136.

Hab. Banda, in the Molucca Islands, *Blume.* "Locus inter *Ch. microphyllam*, Sw., et *Ch. vestitam*, Sw." *Bl.*

27. Ch. *Kleinhoffii*, Bl.; "frond pinnate pubescent beneath, pinnæ subopposite ovato-oblong obtuse repando-crenulate, upper ones entire, lower ones auriculato-trilobate, involucres obsolete continuous, rachis and stipes pubescent." *Blume, En. Fil. Jav. p.* 137.

Hab. Java. "Ex herbario javanico Cl. Kleinhoff sub nomine *Acrosticho appendiculato*, Willd. accepi." *Bl.*—The above is all the information we possess respecting the two supposed species, *Ch. Moluccana* and *Ch. Kleinhoffii*, Bl.

28. Ch. *multifida*, Sw.; caudex short thick slightly creeping clothed with black subulate scales, roots tufted fibrous, stipites 4—6 inches long plane and marginate above on the upper side terete below a little scaly at the base and as well as the rachises stout rigid deep ebony-black glossy, fronds glabrous deltoid-ovate acute when young often with glandular dots beneath tri- below quadripinnate coriaceous (in fruit), primary pinnæ subopposite broad ovate subdeltoid petiolate, pinnules or segments oblong pinnatifid, lobes subrotund convex each bearing 2 to 4 subrotund flattish appressed pale brown submembranaceous distinct involucres. (Tab. C. B.) *Sw. Syn. Fil. p.* 129 *et* 334. *Blume, Fil. Jav. p.* 157. Ch. Capensis, *Eckl. in Un. It. n.* 168. Adiantum globatum, *Poir.*

Hab. Cape of Good Hope, in rocky and stony places; extending as far as Albany, (*Harvey, in Herb. nostr.*) St. Helena, *Bennett, in Herb. nostr. Roxburgh, in Herb. Banks.* Lofty mountains of Java, *Blume, in Herb. nostr.*—If the sterile pinnæ and pinnules of this be alone inspected, its affinity with *Ch. Mysurensis* is considerable:—but the very different outline of the much more compound fronds, broadish below, will invariably distinguish

it. Blume's specimens from Java, and those from St. Helena, are identical with our numerous ones from South Africa.

29. Ch. *triangula*, Kze.; "frond triangular thick coriaceous glabrous tripinnate, pinnæ and pinnules petiolate remote patent, secondary pinnules or laciniæ oblong obtuse sinuato-lobate marginate the margin inflexed crenate, involucres marginal and as well as the sori at length diffuse contiguous, stipes and rachises flexuose rigid purple slightly hairy, caudex short." *Kunze, in Linnæa*, x. *p.* 536.

Hab. Caffraria and near the Cape, *Eklon*. Rocky places in the Sneeuwbergen, Witbergen and Compasberg, *Drège*. Natal, *Krauss*, *n.* 385.—"In habit resembling *Ch. multifida*, Sw., but differing in the triangular frond, which is triplicato-pinnate and the pinnæ not glandular beneath." Yet Kunze describes his var. *β. flexa* of *Ch. multifida* as "frondo subtriangulari (novella) subeglandulosa."—Drège, according to my herbarium, distributes two forms under this name, one marked (*d*) with young fructification, which I consider identical with *Ch. multifida*, Sw.; the other marked (*b*) without fructification, and sufficiently agreeing with Kunze's description of the frond of *Ch. triangula*, differing from *Ch. multifida* in the "triangular frond" and in the larger pinnules. Krauss's solitary Port Natal specimen in my herbarium, seems the same as this latter, but is less triangular. It has the fructification of *Ch. multifida*, and seems almost to unite the two. At any rate, we know other species of *Cheilanthes* to vary as much or more than those we are now considering.

30. Ch. *Mathewsii*, Kze.; caudex stout creeping clothed with black-brown shining scales, stipites 2—4 inches long ebeneous glossy slightly downy above, fronds a span to nearly a foot long coriaceous linear-lanceolate rather obtuse tapering much below in consequence of the contracted pinnæ there, glabrous above, the stiff rigid rachis glanduloso-pubescent, pinnate scarcely bipinnate, pinnæ subpetiolate approximate above very distant and gradually becoming very small below deltoid more or less acuminate sometimes caudate, the segments or pinnules linear-oblong deeply crenated with the margin recurved so as to give almost a beaded appearance to the pinnæ, the teeth of the crenatures bear the squamæform distinct but approximate involucres. *Kze. in Schkuhr, Fil. Suppl. p.* 50, *t.* 25. Ch. pruinata, *Kaulf. En. Fil. p.* 210. Ch. pruinosa, *Kunze, in Linnæa*, xxiii. *p.* 245.

Hab. Peru, (*Kaulfuss*). Crevices of rocks and dry places, Huamantanga, *Mathews*, *n.* 605. Bolivia, *Tweedie*, (smaller, pinnules shorter).—Kunze's plate gives a very good general representation of this very distinct Fern: except that the very beaded outline of the segments of the pinnæ is not shown. Many of our specimens are much more slender and many much longer, but they do not, although very copiously in fructification, exhibit such large, white involucres.—The texture is peculiarly firm and rigid, the

fronds drying to a dirty olive-brown colour. In the 23rd volume of the 'Linnæa,' Kunze refers the species to "*Ch.' pruinosa*, Kaulf.": — but Kaulfuss' name is *pruinata*, and that name must have been given from a character which does not exist in the perfect specimens of the species, and which was probably the effect of some injury; "pinnulæ supra crusta tartarea tectæ."

31. Ch. *hirta*, Sw.; roots tufted, caudex subrepent, stipites short 2—4—6 inches long glossy purple-brown terete very hairy and more or less glandular shaggy at the base with very long glossy fuscous subulate scales, frond 1—1½ foot long lanceolate or broad oblong-lanceolate lengthened (in outline and circumscription) by the small contracted distant pairs of lower pinnæ, subcoriaceous hairy on both sides bipinnate or tripinnate, primary pinnæ crowded or lax lanceolate the lower ones opposite very distant gradually becoming small the lowermost pair often scarcely a line long, pinnules oblong or ovate pinnatifid or crenulate, the lobes with the margin recurved and bearing the copious more or less confluent sori. (Tab. CI. B.) *Sw. Syn. Fil. p.* 128 *et* 329. *Will. Sp. Pl.* v. *p.* 458. Adiantum Caffrorum, *Sw. in Schrad. Journ.* 1800, ii. *p.* 85. *Blume, En. Fil. Jav. p.* 137. *Kunze, in Linnæa*, x. *p.* 539. — Var. *parviloba*; frond bi- tripinnate calvescent, pinnæ lanceolate elongate and remote, pinnules sub-trilobed or auriculate at the base, lobes obtuse convolute, middle one oblong-linear, stipes slightly paleaceous at the base, rachis paleaceo-hirsute. Ch. parviloba, *Sw. Syn. Fil. p.* 128 *et* 331.

Hab. Cape of Good Hope: extending East to Graham's Town and Port Natal, thence North to Macalisberg, (*Burke*). Lofty mountains of Java, *Blume, in Herb. nostr.*—It would be hardly possible, with the most elaborate figures, to give a good idea of this protean species. The accurate Kunze enumerates four forms in the 'Linnæa,' vol. x.; but it would be as easy to constitute twenty as four.—The more usual state of the plant from the vicinity of Cape Town, is to be from a span to a foot high, narrow, 2 inches broad, the primary pinnules pointing upwards, most of them very approximate, the lower small ones always distant: from this form there are various gradations, in various districts, to the state which appears common at Uitenhage and Graham's Town (*Mr. Atherstone*), whence we have copious specimens from 1½ to 2 feet long, 4 and 5 inches wide, the primary pinnæ lax, horizontally patent, even the upper ones distant, the secondary pinnæ with the lower pinnules much longer than the rest, pinnatifid with longer laciniæ, and the whole of these pinnæ (not the stipes and rachis) in some specimens quite glabrous. These would come under the var. *laxa*, Kze. Blume's plant from Java is identical with the more common African one.

32. Ch. *induta*, Kze.; "frond oblong obtuse coriaceous 4—5 inches long subquadripinnate, pinnæ rather remote petiolate adscending, pinnules shortly petiolate ovate, secondary

oblong, tertiary and the laciniæ roundish-ovate, all glabrous above beneath paleaceo-hirsute, involucres marginal crenulate and as well as the sori continuous, stipes flexuose sparingly and the rachises densely paleaceo-hirsute purple, caudex creeping branched flexuose." *Kze.* (Tab. CII. A.) *Kunze, in Linnæa*, x. *p.* 538.

Hab. Rocky shady places in Snecuwbergen, *Drège.*—" Approaches *Ch. hirta* and somewhat *Ch. lendigera*; but it differs from the latter in the curved pinnæ and very narrow scales, from the former in the more compound frond, remote pinnæ, with the pinnules twice as large and the stipes glabrous. A foot high." *Kze.* — Our specimens from Drège, marked *Ch. induta*, Kze., *a.*, are much less paleaceo-hirsute (hence a good deal resembling *Ch. multifida*, only that is quite glabrous) than those marked *β.*, which are very paleaceo-hirsute beneath, while the upper side of the frond and stipes and rachises are glabrous. — Our figure is taken from the specimen marked *β.*

33. Ch. *pubescens*, H. B. K.; "fronds at the apex bi- at the base tripinnate, pinnules oblong or obovate-rotundate obtuse subsessile entire upper ones confluent, rachises pubescenti-hirsute, stipes glabrous." *H. B. K. Nov. Gen. Am.* i. *p.* 21. *Presl, Tent. Pterid. p.* 160.

Hab. At the bases of the mountains near Xalapa, Mexico: elevation 4,200 feet. *H. B. K.* — " Fronds 4—5 inches long, at the apex bi- at the base tripinnate: primary pinnæ subopposite, lower ones scarcely an inch long, superior ones confluent; secondary pinnæ alternate, 3 lines long: pinnules alternate, obovato-rotundate or oblong, subsessile, pubescent, entire, a line long, terminal ones smaller, confluent. Universal and partial rachis nearly terete, black, pubescenti-hirsute. Stipes as long as the frond, terete, black, glossy, pubescent above, towards the base clothed with subulate, diaphanous, ferruginous scales. Sori marginal, at length confluent. Sporangia ferruginous. Indusium crenate, diaphanous, glabrous." *H. B. K.* — This species is acknowledged as such by Presl and others, yet I do not anywhere find its affinities alluded to.

34. Ch. *MacLeanii*, Hook.; roots tufted from a knobbed scaly caudex, whole plant clothed with spreading glandular jointed hairs the shorter hairs the most generally glandulifer-ous, stipites aggregate 2—4—5 inches long and as well as the main rachis ebeneous glossy, fronds 6—8 inches or even a foot and 14 inches long linear-oblong bi- subtripinnate membranaceous but rather rigid dark dirty-brown when dry, primary pinnæ petiolate subopposite in rather distant pairs especially the lower ones long-ovate, pinnules large (for the size of the plant) broad ovate the lower ones petiolulate and distant, upper ones confluent all lobed or pinnatifid very obtuse, involucres squamiform semiorbicular glossy-brown close pressed over the sorus all free but closely placed. (Tab. CX. B.)

Hab. Andes of Peru, *John MacLean, Esq.*—One of the most distinct of any species of the genus, of a very dingy, dirty, dark brown color (in its dry state), remarkable for the large size of the pinnules and their distant position from each other on the rachis, and for the copious glandular hairs with which the whole plant is clothed. I have not observed that any of the involucres are confluent; but although at first they are close-pressed to the under-side of the frond, the sori eventually force them back and they form a ragged edge to the pinnules and the lobes. I have never received this *Cheilanthes* from any collector but Mr. MacLean.

35. Ch. *Mysurensis*, Wall.; roots densely cæspitose the fibres very woolly, stipites slightly scaly below short 1—2 inches and as well as the main rachises deep glossy ebeneous rigid, frond a span or more long in outline narrow-oblong acute tapering below by the diminishing of the pinnæ glabrous membranaceous but firm bipinnate, lower pinnæ very small all of them oblong-ovate sessile frequently opposite pinnate below, the upper half pinnatifid, pinnules or segments linear-oblong plane (much incurved if dried without pressure) toothed or lobato-pinnatifid, each tooth or lobe bearing one or two subconfluent small whitish suborbicular sori. (Tab. C. A.) *Wall. Cat. n.* 66. Ch. fragrans, *Swartz, Syn. Fil. p.* 127 *et* 325, *t.* 3, *f.* 6, (*not* Polyp. fragrans, *Linn. Mant.* ii. *p.* 307, *which is* Ch. fragrans *of Webb and Bert. and of this work; nor* Pol. fragrans, *Linn. Sp. Pl. p.* 1550, *which is* Aspidium fragrans, *Sw.* Lastrea, *Pr.*) Ch. Swartzii, *Webb et Bert. Phytogr. Canar. p.* 454 *in note.* Ch. opposita, *Kaulf. En. Fil. p.* 211, (*incorrect in the locality, "Cape of Good Hope"*). Asplenium Mysorense, *Heyne, in Roth, Nov. Sp. Ind. Or. p.* 395?

Hab. "One of the most common Ferns in the Madras Peninsula, found among rocks and hills, at all heights, from 50 feet to 3,000 feet above the level of the sea," *Dr. Wight, in Herb. Wight. Propr. n.* 28. Neura Ellia, Ceylon, 6,000 feet, *Gardner.*—We have shown, under *Ch. fragrans* of Webb et Bert., that those botanists have settled the question respecting the identity of the plant of that name. It is quite clear that Swartz's *Ch. fragrans* is of Indian origin, gathered by König, probably in the Madras Peninsula, and it is equally probable that Röttler's specimens (described by Kaulfuss) were gathered in India and not at the "Cape of Good Hope?" We have, what is far more satisfactory, Swartz's figure of his Indian *Ch. fragrans*, and, making allowance for its being the work of a Swedish artist nearly half a century ago, it cannot but be commended as a faithful representation of a small plant of Dr. Wallich's *Ch. Mysurensis*. Even the magnified figures, though caricatured, show the projecting lobes which bear the sori, and which are so remarkable in this species. Some of our copious specimens are more than a foot long. All are distinguished by the black rigid stipes and rachises, and by the distant lower pinnæ diminishing almost to the base of the stipes into a mere scale. Plentiful as it is in the

Madras Peninsula, it seems quite confined to that district, and to the mountains of Ceylon, where it has been recently found by the lamented Mr. Gardner.

36. Ch. *Chusana*, Hook.; small, root tufted, stipites tufted very short 2—4 lines long slightly scaly (scales small subulate) and as well as the main rachis ebeneous glossy plane on one side or furrowed above, frond lanceolate attenuated below 3—4 inches long rather rigid subcoriaceo-membranaceous glabrous bipinnato-pinnatifid, primary pinnules petiolate subdeltoid, lower ones opposite and gradually smaller the rest alternate, secondary pinnæ rather distant and as well as the laciniæ linear crenato-lobate or lobato-pinnatifid obtuse, involucres in pairs formed of the inflexed lobules membranous and pale only at the edge distinct but copious and approximate. (Tab. CVI. B.)

Hab. Cliffs, Chusan, *Mr. Alexander*.—Apparently a very distinct species from any hitherto published, but allied to *Ch. Mysurensis*. It differs from it in the small size, broader and shorter primary pinnæ, but especially in the involucres, which are more decidedly inflexed margins of the pinnules, and always in pairs. The stipes, short as it is, is ebeneous, glossy, and plane on the upper side, and where it forms the primary rachis it is distinctly furrowed, I have seen this in no collection but that received from Mr. Alexander.

37. Ch. *tenuis*, Pr.; "fronds ovate tripinnate bipinnate at the apex, pinnules sessile oblong obtuse nearly glabrous, upper ones confluent, sori distinct, rachises and stipes villoso-paleaceous." *Presl, Reliq. Hænk. p.* 65.

Hab. Mexico, *Hænke*.—Presl says nothing about the affinities of this species, and only gives descriptive notes; "Caudex very short small, clothed with black setæ. Stipes 3 inches high filiform terete blackish-brown; villous with piliform articulated brown paleæ. Frond an inch and a half long as much wide at the base, below tri- at the apex bipinnate. Pinnæ lanceolato-oblong, obtuse, subopposite shortly petiolate. Pinnules sessile oblong obtuse deeply crenate bearing scattered hairs, 2 lines long, 1 broad: upper ones confluent. Rachises blackish brown villous with piliform articulated paleæ. Sori small distinct, situated in the sinuses of the membranaceous crenulated involucres."

Lendigera-group.

** Hairy, rarely scaly or chaffy.*

38. Ch. *lendigera*, Sw.; caudex much creeping villous with brown chaffy hairs, stipites distant a span to a foot long brown and as well as the rachises more especially densely clothed with tawny brown long scarcely chaffy hairs most copious and persistent in the rachises more or less deciduous on the stipes, fronds a span long oblong or ovato-lanceolate subcoriaceous

3· sub 4-pinnate, primary pinnæ patent from a broad base oblong acuminate, pinnules orbicular sessile, sterile ones crenato-lobate in fruit subglobose (from the great reflexion of the margins) glabrous above very villous beneath with long tawny hairs, involucre a broad white plane membranaceous margin continued all round the pinnule. (Tab. CIV. B.) Ch. lendigera, *Sw. Syn. Fil. p.* 128 *and* 328. Ch. lentigera, *Willd. Sp. Pl.* v. *p.* 460, *not Mart. and Galeotti, (according to their specimens, n.* 6391 *and* 6437). Pteris lendigera, "*Cav. Præl.* 1801, *n.* 664." Cheilanthes lanuginosa, *Mart. et Galeotti, Syn. Fil. Mex. p.* 75, *t.* 20, *f.* 2. — *β.* hairs of the rachis less copious and more chaffy. (Tab. CVI. A.) Ch. minor, *Mart. et Galeotti, Syn. Fil. Mex. p.* 75, *t.* 21, *f.* 1.

Hab. Quito and New Spain, (*Swartz*). Real del Monte and Pic de Orizaba, Mexico, elevation 6,500—9,500 feet above the sea, *Galeotti, n.* 6430. Guatemala, *Skinner*. High mountains of Sierra Nivada, Santa Martha, *Purdie*, (very fine).—*β.* Cordillera of Vera Cruz, *Linden, n.* 49. *Galeotti, n.* 6256, and *n.* 6467 and 6257, (from the Peak of Orizaba, 11,500 feet).—This does not appear to be a common plant in collections; and, notwithstanding the accuracy of Dr. Swartz's description above quoted, I fear it is often confounded with others of the *Lendigera*-group, a small section always more or less copiously woolly or scaly, with the pinnules, in fructification at least, so orbicular and subglobose as to resemble small lentil-seeds, whence more recent authors, supposing that *lentigera* (lentil-bearing) rather than *lendigera* (nit-bearing) was intended by Cavanilles, have adopted Willdenow's orthography. This species is readily distinguished from its near ally, *Ch. myriophylla*, Desv., by the absence of the copious and decidedly chaffy *scales* of the latter. *Ch. lendigera* has no true scales, though the hairs sometimes become chaffy, *i. e.*, broader and membranaceous at the base. I have seen no specimens from Quito, a habitat given, probably after Cavanilles. My finest specimens were gathered by Purdie on the Nivada de Sta. Martha, New Grenada. — I cannot consider the *Ch. minor* of Martens and Galeotti otherwise than as a mere variety of this plant, in which the hairs are so dilated below (though long and slender) as to have a chaffy appearance, a character clearly pointed out in their description.

39. Ch. *tomentosa*, Link: roots densely tufted fibrous, stipites 3—5 inches long rather slender ebeneous brown and as well as the principal rachises clothed with pale erect paleaceous hairs mixed with copious erect linear-subulate scales broad on the under side of the partial rachises and there closely imbricated, fronds 4—8 inches long oblong-lanceolate bitripinnate copiously clothed above with white woolly hairs beneath densely woolly with tawny tomentum, primary pinnæ oblong, pinnules small subrotund or obovate nearly entire the margins recurved and forming a nearly continuous involucre with the edge slightly membranaceous. (Tab. CIX. A.)

Link, Fil. Hort. Berol. p. 65. *Kze. in Silliman's Am. Journ.* 1848, *p.* 87, *(name and remarks).*

Hab. Mexico: raised from spores taken from a native specimen by *Professor Link*. Southern United States of America. North Carolina, *Rugel* (according to *Kunze*): also sent to Dr. Kunze by *Dr. Asa Gray* from Tenessee. Rattene mountains, head waters of the Colorado, *Gordon, in Herb. nostr.* Collected in an Expedition from Western Texas to El Paso, New Mexico, *Ch. Wright, n.* 816. — Brief as is the account given us of *Ch. tomentosa* by Professor Link, we can have little difficulty, though we do not possess authentic samples, in referring to it our specimens of *Cheilanthes* from Mr. Gordon and Mr. Chas. Wright. Link well observes, "frons 6—8 pollices longa, pinnæ vix pollicem longæ, petiolus (stipes) cum rachi pilis longis squamiformibus albis:" and further, "affinis *Ch. vestitæ*, at differt primo intuitu rachi dense et albo-pilosa, quæ in *Ch. vestita* pilis laxe positis ferrugineis obsita." Our specimens have the hairs of the upper surface and margin white, while the tomentum beneath is tawny: — the aspect is much whiter than any of our specimens of *Ch. vestita*. The whole plant, too, is stouter, intermediate in this respect between *Ch. vestita* and the following, *Ch. Bradburii*: — but the chief distinction from the former (*Ch. vestita*) is to be found in the presence of the erect appressed scales on the stipes, rachis, and especially on the under side of the secondary rachises, much the same character, indeed, by which *Ch. myriophylla* is distinguished from *Ch. lendigera*, only here the true scales are less numerous, and confined to the underside of the principal rachises, and scarcely conspicuous enough to justify our placing *Ch. tomentosa* in the following sub-group.

40. Ch. *Bradburii*, Hook.; root of copious fibres from a short thick horizontal caudex, stipites clustered 5—8 inches long stout brown and ebeneous scaly with long glossy ferruginous subulate scales at the very base, the rest and the rachises densely clothed with long tawny soft woolly hairs mixed with very slender long paleaceous ones, fronds oblong-lanceolate rigid 8—12 and even 14 inches long 3—4-pinnate slightly woolly with white deciduous hairs above permanently woolly with short tawny wool beneath, primary pinnules rather distant lower ones more so and petiolate all oblong subacuminate, pinnules small oval or obovate entire or only lobed as an indication of more compound pinnation, the margin recurved with a pale distinct membrane at the edge constituting the nearly continuous involucre. (Tab. CIX. B.)

Hab. Southern United States, Manitou rocks, 250 miles up the Missouri, *Mr. Bradbury*. Texas, *Drummond, second collection, n.* 254; *Lindheimer, Fl. Texana Exsiccata, fasc.* iv. *n.* 743. "Jamaica, *Mr. Wiles*," (given me as such by Mr. Lambert; but possibly one of Mr. Bradbury's, so named by mistake). Affghanistan? *Griffith, in Herb. nostr.* — Very closely allied to *Ch. tomentosa*, Link, it must be confessed; yet I think distinct in its stronger, stouter habit and larger size, more tawny (for the sparse white hairs on the upper side do not give the hoary appearance so conspicuous in *Ch. tomentosa*), the absence of real scales (although the hairs are often

paleaceous), the more oval pinnules, but above all the distinct and rather broad membranaceous margin to the involucres. All the characters of our American specimens exist equally in the Affghanistan ones.—As Mr. Lambert, I believe, possessed a full collection of Mr. Bradbury's plants from the Missouri, I cannot help expressing a suspicion that the specimen he gave me as from "Mr. Wiles, Jamaica," is a Missourian one.

41. Ch. *Szovitzii*, Fisch. et Mey.; roots densely tufted from a short thick caudex, stipites crowded 2—4 inches long slender and as well as the principal rachises ebeneous somewhat hairy mixed with copious long spreading subulate scales, fronds 3—4 inches long oblong-lanceolate quite glabrous above densely woolly and generally tawny beneath tri-subquadripinnate, primary pinnæ ovate acuminate approximate or distant, pinnules small subrotund or subcordate sublobate, terminal ones often larger and oblong, the margin revolute forming nearly a continuous involucre the edges obscurely membranaceous. *Fisch. et Meyer, in Hohenacker, En. Pl. Prov. Talysch, p.* 11.—*α. nudiuscula;* woolly covering short and entirely confined to the underside of the pinnules. (Tab. XCIV. B.) Cheilanthes suaveolens, *β.*, fronde subtus villoso-hirsuta, *Hohenacker, in Herb. nostr.* — *β. Stocksii;* woolly covering of the under-side of the frond exceedingly dense tawny, so copious and spreading as at first sight apparently to invest the whole frond.

Hab. *a.* Rocks near the fort of Schuscha, in Talysch, province of Karabagh, Caucasian Alps, *Honenacker.* Crevices of rocks, Pushut, Kooner-Kafanistan, in Affghanistan, *Griffith, n.* 11, *in Herb. nostr.* Indus valley, 7,500 feet; rocks, Kashmir; and in Western Tibet, 8,500 feet, *Dr. T. Thomson.* — *β.* Chihil Tun, Scinde, *Dr. Stocks, n.* 1020, *in Herb. nostr.* Affghanistan, with *a., Griffith.* Iskardo, valley of the Indus, 7,000 feet, *Dr. T. Thomson.* — So closely does this *Cheilanthes* resemble in habit and ramification and woolliness the North American *Ch. vestita*, that notwithstanding the respective countries are so widely apart, I was disposed to consider it at first a local variety of that species: but when in conjunction with the different locality I find that our oriental specimens, gathered in several regions, have the upper side of the frond invariably glabrous (however densely woolly the under side may be), and that there are always copious scales mixed with the hairs on the stipes and rachises, I consider it safer to keep them distinct: and our Tab. XCIV. B. exhibits a faithful representation of the less woolly state originally found by Hohenacker, and obligingly communicated to me many years ago by its discoverer, under the name of *Ch. suaveolens* (meaning our *fragrans*) *β.*, frondibus subtus villoso-hirsutis. The size and ramification do indeed considerably resemble that species: but the vestiture and involucres are quite different.

42. Ch. *vestita*, Sw.? roots tufted, stipites 3—4 inches long slightly scaly at the base flexuose and as well as the main rachis ebeneous and laxly woolly, fronds about as long as the

stipes lanceolate or ovato-lanceolate tri-quadripinnate hirsute with longish soft hairs above and, at the margins beneath and on the partial rachis, densely woolly the wool more or less tawny, primary pinnæ ovate the lower two pairs generally remote upper ones more crowded, pinnules small nearly orbicular obscurely crenato-lobate at the margins the terminal pinnule generally larger and more oblong, the margin recurved and forming the nearly continuous involucres not membranous at the edges. (Tab. CVIII. B.) *Sw. Syn. Fil. p.* 128? *Schkuhr, Fil. p.* 1162, *t.* 124? *Willd. Sp. Pl.* v. *p.* 456. Ch. lanuginosa, *Nutt. MS. in Herb. nostr.* Adiantum vestitum, "*Spreng. Anleit.* iii. *p.* 122." Aspidium lanosum, *Sw. Syn. Fil. p.* 58, *(Willd.)* Nephrodium lanosum, *Mich. Am.* ii. *p.* 270. Notochlæna vestita, *Desv. J. Sm.* — β. smaller, tripinnate, primary pinnæ all distant.

Hab. N. America. Not unfrequent in the Southern States; westward to Texas and El Pasco (New Mexico), *C. Wright, n.* 818. Missouri, St. Louis, *Engelman*, (var. β.); Independence, *Nuttall*, to the Rocky Mountains in about lat. 52°. California, and New Caledonia, Oregon, *Douglas*. —What we here describe and figure as *Cheilanthes vestita* is, we know, the plant so considered by American botanists, and is no doubt the *Nephrodium lanosum* of Michaux, Fl. Bor. Am. (1803), and he properly describes the fronds as "lanosissimæ." Swartz, however, who adopts Sprengel's (prior?) specific name, *vestita*, given in a work to which I have no immediate access, describes the fronds as *hispidulous*. Schkuhr adopts the same term, and figures a plant, the under side of which gives no idea of the really woolly nature of the frond; having, moreover, entire oblong pinnules, with a solitary terminal involucre.—The hairs of this species are everywhere crisped and woolly, very dense on the under side, often sparse and deciduous on the upper side.

Lendigera-group.

** *Very scaly.*

43. Ch. *scariosa*, Pr.; caudex 3 inches and more long descending radicose the summit densely crinite with ferruginous chaffy hairs, stipes 1—2 inches long and as well as the rachis and lanceolate bipinnate frond (about a span long) clothed above with dense silky wool and beneath everywhere with closely imbricated white diaphanous ovate scales ciliated and villous at the margin often rich brown in the centre, bipinnate, pinnæ short lanceolate of 5—9 almost globose coriaceous pinnules glabrous above woolly beneath crenato-lobate at the margin, the margins involute and forming the involucres. (Tab. CIV. A.) *Pr. Reliq. Hœnk. p.* 65. *Kunze, in Linnæa*, ix. *p.* 85. Acrostichum scariosum, "*Willd. Sp. Pl.* v.

p. 125." *Sw. Syn. Fil. p.* 16. A. lanuginosum, "*Willd. in Act. Erford.* 1802, *p.* 31, *t.* 3, *f.* 4."

Hab. Mountains of Peru, *Dombey*, *Presl.* Fissures of rocks between San Rafael and Huarriaca (Huanaca?), Peruvian Andes, *Poeppig.* Limestone rocks ascending the Cordillera from Tarma, Andes, Peru, *Mathews*, *n.* 610, *MacLean.* — I have not had the opportunity of seeing the figure of this plant published by Willdenow, nor have I any specimens from Mexico, where the plant is said by Willdenow to have been found, and where it was detected by Karwinsky, according to Kunze. Our Peruvian specimens are extremely distinct from *Ch. lendigera*, to which Presl says it is "maxime affinis," nor should we be at all disposed to say with Kunze, "*Ch. squamosa*, Hook. et Grev. t. 151, differt fronde bipinnata." Presl remarks that Willdenow's specimens are "quadripinnate." Ours are bipinnate, as Swartz and Kunze describe the species: but so dense is the mass of silky wool on the upper side (springing indeed from the rachis but covering and concealing the whole frond) and so dense the mass of scales beneath, that it is only by carefully removing these coverings that the true nature of the ramification or the pinnules themselves can be seen. It is an extremely beautiful white and silvery species, probably rare: for ourselves, we have only received Andine Peruvian specimens from Messrs. MacLean and Mathews. When dry, the pinnæ are very apt to roll or to be reflexed back towards the upper side of the rachis. —I dare not quote the *Ch. scariosa* of Dr. Klotzsch, 'Linnæa,' xx. 338 as a synonyme to our plant. His is a plant from Caraccas, of Moritz, n. 33, and he further quotes Hartweg's n. 1518 from Columbia, both of which are clearly what we here consider *Ch. elegaas*, and he quotes *Ch. lendigera* of Presl, not his *Ch. scariosa*, which latter, nevertheless, I think is clearly ours, for he speaks of the frond as "squamis lanceolatis scariosis *albis diaphanis* densissime obtecta." Willdenow, too, the original authority for our plant, expressly says, "singularis filix fronde bipinnata ex toto squamis albis nitidis obtecta ita ut de pinnulis nemo aliquid observet," which could not be said of Moritz' n. 33, nor Hartweg's n. 1518: a species of *Cheilanthes* that must have been familiar to Willdenow. Klotzsch, on the other hand, gives the Herbarium of Ruiz and Pavon as containing his *Ch. scariosa* "in Andium montibus ad Huanuci et Tarmi tractus," which seems to be exactly the region of our plant. He further quotes a Pernvian plant of Dombey's herbarium from Peru, and Mr. John Smith has a specimen of our Fern from Dombey in his collection. Dr. Klotzsch however offers no distientive remarks on his species.

44. Ch. *myriophylla*, Desv.; roots tufted, caudex scarcely any nodose clothed with black bristly appressed scales, stipites tufted 3 inches to scarcely a span high clothed as well as the rachises with copious ash-coloured hairs, the rachises have in addition copious ovate or ovato-lanceolate pale brown membranaceous ciliated ovate or lanceolate scales which cover and conceal the under side of the pinnules, fronds 4—6—8 inches long oblong or lanceolate rigid subcoriaceous trisubquadripinnate, primary pinnæ oblong subacuminate rather closely placed, secondary pinnæ linear-lanceolate, pinnules

minute sessile orbicular and subglobose from the inflexed fructified margins glabrous above very hairy beneath, involucres a continuous membrane forming a pale edge to the recurved margin (the hairs of the partial rachises and of the under side of the pinnules often long and crisped and more or less enveloping the whole of the minute pinnules). (TAB. CV. A.) *Desv. in Journ. de Botanique*, ii. *p.* 44, *t.* 13, *f.* 1. *Kunze, in Linnæa*, ix. *p.* 85 ? Ch. elegans, *Kunze, according to his specimen (of Poeppig) from Peru, in Herb. nostr. H. B. K. Nov. Gen. Am.* i. *p.* 22, *(according to Kunze).* Notholæna mollis, *Kunze, in Linnæa*, ix. *p.* 54, *(according to his specimen from Poeppig in my Herbarium).*

Hab. South America, (*Desvaux*). Andes of Quito, *Jameson.* Loja, Equador, *Seemann*, *n.* 948. San Rafael, Huanuco, elevation 6,000 feet, Peru, *Poeppig*, *MacLean.* Chacapoyas, and Purrochuca, on dry sandy banks, *Mathews*, *n.* 607. Bolivia, *Pentland.* Sta. Martha, *Purdie.* Toluca and near Oaxaca, Mexico, *Andrieux.* — A species first distinguished from *Ch. lendigera* by Desvaux. It is much smaller than that, has tufted stipites springing from a small nodose caudex, narrower fronds, copiously clothed at the back with scales (springing from the rachises) as well as hairs, smaller but equally rounded, and sessile pinnules. Kunze's *Ch. elegans*, of his distributed specimens, is clearly our *Ch. myriophylla.* He refers the *Ch. myriophylla* of H. B. K. to his *Ch. elegans*, but whether justly so or not I am unable to say.

45. Ch. *Lindheimeri*, Hook.; caudex very long about as thick as a crow-quill creeping branched and entangled clothed with brownish scales, stipites scattered 4 inches to a span high ebeneous beset with subulate narrow lanceolate cinereous appressed more or less deciduous scales, more abundant upwards and in the rachises where they are copiously mixed with larger ovate fimbriated brown scales covering the under side of the pinnæ and fine cinereous wool which more or less densely covers and conceals the upper side of the pinnæ, fronds 3—5 inches long ovato-lanceolate subcoriaceous tripinnate, primary pinnæ oblong acuminate approximate lower ones more distant nearly opposite, secondary pinnules crowded linear oblong, pinnules very minute densely crowded sessile subglobose glabrous above woolly beneath the margins much recurved, involucres formed by the continuous recurved margins having a very narrow membranous edge. (TAB. CVII. A.)

Hab. Western Texas, *Lindheimer, Fl. Tex. Exsic. n.* 744, (1847). Between Western Texas and El Pasco, New Mexico, *C. Wright, n.* 817, (1849). Sierra Madre, New Mexico, *Seemann*, *n.* 1934, (smaller specimens, but otherwise identical).—It is not without considerable hesitation that I constitute a new species of this, yet I cannot by any means satisfactorily refer it to

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any described one. The copious scales on the under side of the frond readily distinguish it from *Ch. lendigera*, which it resembles in the long creeping caudex. The rounded sessile pinnules keep our plant distinct from *Ch. elegans*, and the very woolly or tomentose upper side of the frond, the very crowded pinnules and secondary pinnæ and compact habit, and above all the long creeping caudex separate it both from *Ch. elegans* and *Ch. myriophylla*.

46. Ch. *elegans*, Desv.; roots tufted, caudex scarcely any nodose clothed with dark brown appressed bristly scales, stipites tufted a span to nearly a foot long clothed as well as the rachises with numerous pale brown hairs, the partial rachises in addition with copious brown fringed scales concealing the under side of the pinnules, main rachis often zigzag, fronds a span and more long broad-oblong or ovato-lanceolate tripinnate acuminate, primary pinnules often lax from a broad base oblong acuminate, secondary pinnæ lanceolate rarely again pinnated, pinnules very minute glabrous above villous beneath obovato-globose (subpyriform) with the margins much recurved tapering at the base (especially the terminal ones) into a distinct short petiole, involucres apparently formed of the recurved margin of the pinnules with scarcely any membranous edge, (hairs of the partial rachis and under side of the pinnules woolly with the wool concealing more or less the entire minute pinnules). (Tab. CV. B.) *Desv. in Journ. Bot.* ii. *p.* 43, *t.* 13, *f.* 1. *Kunze, in Linnæa*, ix. *p.* 85? Ch. lendigera, *Mart. et Galeotti, Syn. Fil. Mex. p.* 74, *and* Ch. paleacea, *p.* 76, *t.* 21, *f.* 2. Ch. lendigera, *Moritz, in Herb. Caracas (not Sw.), n.* 33.

Hab. Chili, (*Desvaux*). Quitinian Andes, *Jameson*. Columbia, between the village and bridge of Guapulo, *Hartweg, n.* 1518. Andes of Peru, *MacLean*. Caracas, *Moritz, Linden, n.* 512. Mexico, *Bates*. Oaxaca, and near Tampico, elevation 6,500—8,000 feet, *Martens and Galeotti, n.* 6391, 6437, and 6429. Tucuman, *Tweedie*. La Casa Pintada, Rio del Diamante, eastern side of the Cordillera of Chili, *Dr. Gillies*. — This species was, as well as our *Ch. myriophylla*, first distinguished by Desvaux, and assuredly the majority of our specimens have the minute pinnules so distinctly tapering into a petiole, generally too accompanied by a broader form of frond, a more lax habit, and frequently a zigzag main rachis, that the differences are almost perceptible with the naked eye, and distinctly seen with a small power of the lens. Others again have the side pinnules almost if not occasionally quite sessile, though the terminal pinnule is petiolate; so that I am sometimes led to doubt of the permanency of the character. Both in *Ch. myriophylla* and *Ch. elegans* the same copious scales accompany the hairs on the rachises, covering and concealing the under side of the pinnules: and in both the hairs of the partial rachises and of the under side of the pinnules are so long and woolly as to cover and partially conceal the upper side of the pinnules.

47. Ch. *Fendleri*, Hook.; small, caudex creeping scaly, stipites sparse scattered slender brown scaly with subulate appressed scales, in the main and secondary rachises the scales become more copious broader ovate acuminate white glossy brown at the base, fronds 2—3 inches long ovate-lanceolate subcoriaceous pale green quite glabrous on both sides tripinnate, primary pinnules ovato-lanceolate obtuse, pinnules rather large for the size of the frond convex broad cuneate sessile somewhat decurrent retuse at the apex entire or 2—3-lobed, the margins of the lobes merely incurved scarcely confluent and forming the involucres. (Tab. CVII. B.)

Hab. New Mexico, *Fendler, in Pl. Nov. Mex. n.* 1015, (1847).—In many respects this species of *Cheilanthes* approaches the Lendigera-group: but it is the smallest of that section, and has the pinnules larger than any. There are no hairs on this plant whatever; where the scales are discontinued on the under side, as at the secondary pinnæ, the pinnules are seen to be quite glabrous, and the rachises even of the primary pinnæ have no scales or clothing of any kind, and are of the same texture and pale green colour as the pinnules.

48. Ch. *speciosissima*, Alex. Braun; stipes 3—4 inches long squamose with copious large ferruginous lanceolate spreading scales, the same scales are continued but diminishing in size upwards on the main rachis and on the partial rachises and becoming rather chaffy hairs, frond ample broad-lanceolate acuminate 1½—2 feet in length coriaceous rigid bipinnato-pinnatifid ferruginously hairy on both sides but especially beneath, primary pinnæ approximate linear-oblong acuminate sessile 2—4 inches long pinnatifid at the apex, secondary pinnules oblong obtuse broadest at the base pinnatifid, lobes or segments oblong obtuse entire the margin much recurved, involucres continuous formed of the recurved margins become membranaceous and more or less cut or jagged at the edge.—*Alex. Braun, in Kunze, Analect. Pteridogr. p.* 35, *t.* 23. *Kunze, in Linnæa*, xiii. *p.* 145. *Benth. Plantæ Hartw. p.* 54. Ch. scariosa, *Mart. et. Galeotti, Syn. Fil. Mex. p.* 74. Plecosorus, *Fée.*

Hab. Mexico, *Karwinski.* Near Real del Monte, *Hartweg.* Coscomatepee, Vera Cruz, *Linden, n.* 44. Peak of Orizaba, 12,000 feet elevation, *Galeotti.* — Kunze may well speak of this noble plant as "Filix vere speciosissima:"—some of our specimens show that they attain a length of frond exclusive of stipes, of 2 feet. Yet this species has been referred by Martens and Galeotti to *Ch. scariosa*, Kaulf. (Acrostichum scariosum, *Swartz and Willdenow*). Kunze's figure and description are alike excellent.

(Rachis zigzag).

49. Ch. *dichotoma;* roots tufted, plant wholly glabrous, stipites (4—6 inches long) as well as the zigzag rachis slender ebeneous glossy, fronds a span to a foot long oblong tri-quadripinnate, tertiary pinnæ often trifoliolate, pinnules sparse remote small cordate or ovate subtrilobate or inciso-pinnatifid ultimate lobes often cuneate, each bearing 1—3—4 free rounded small involucres pale at the apex, often confluent. (Tab. CII. B.) *Swartz, Syn. Fil. p.* 129 *and* 335, *t.* 3, *f.* 7. *Willd. Sp. Pl.* v. *p.* 560. Hypolepis trifida, *Klotzsch, in Herb. nostr.*

Hab. Mount St. Antonio, Quito, *Née, (Swartz).* Brazil, *Sellow,* from the Royal Berlin Herbarium. Uruguay, *Mr. Jas. Baird, in Herb. nostr.* — Our first knowledge of this plant is from Swartz, who describes and figures it from Quitinian specimens, gathered by Luis Née. Dr. Klotzsch, unaware of that description, has given it as a new species of *Hypolepis.* It is, however, a true *Cheilanthes,* according to our view of the Genus, and very different from any other species known to me. The roots are densely tufted, as well as the stipites. Stipes and very zigzag and extremely slender capillary rachises glossy ebeneous, plane on the upper surface and margined: lower part of the stipes only scaly. The fronds are quite glabrous, a foot long, primary pinnules elongated, secondary and tertiary shorter, pinnules often ternate (whence probably the name *trifida*), small, sparse, not much unlike the smallest leaflets of *Thalictrum alpinum.* The species is probably quite confined to South Brazil; and it is more than likely that the Quitinian locality given by Swartz has originated in some error.

50. Ch. *flexuosa,* Kze.; "frond rigid subcoriaceous puberulous ovate-oblong acuminate at the base quadri- tri- or bipinnate less divided at the apex, primary pinnæ opposite or alternate petiolate (ad tripinnatis), lower ones arrect or patulous upper ones patenti-divergent, ultimate pinnules petiolate suborbicularo-ovate crenate or incised, sori of few capsules, involucres spurious, partial rachises rigid furrowed above rough flexuose slender purple-black, universal rachis short stout purple-black shining, rhizoma horizontal clothed with subulate appressed brown scales." *Kunze, in Linnæa, t.* 22, *p.* 578. "Ch. microphylla," *Bongard in litt. (non Sw.)* —*β. minor;* contracted bipinnate. *Kze. l. c.*

Hab. Brazil; Cape Goyan, *Pohl, Riedel.* — *β.* Minas Geraes, in very sterile places, *Regnell.* — "Plant with a habit between *Ch. dichotoma* and *Ch. chlorophylla,* but readily distinguishable. It ordinarily attains a foot in length; the dwarf state only about 2 inches." *Kze.*

(Fronds broad triangular.—See Ch. triangula, *at p.* 91).

51. Ch. *viscosa,* Link; an Kaulf.? roots tufted, stipes with

intensely black glossy subulate scales at the base 8—10 inches long slender and as well as the rachises purple-brown glandularly hirsute, fronds submembranaceous pale green minutely glandularly pubescent 6 inches long deltoid ternately tripinnate, pinnæ (except the lowest usually opposite pair) approximate and compact, upper ones lanceolate, middle ones ovato-acuminate, lowest ones deltoid the lower inferior divisions the longest, pinnules rather small obovate convex (the margins much rolled back when dry) lobed or more or less pinnatifid, involucres membranaceous whitish punctiform or more or less continuous frequently the reflexed termination of a lobule. (Tab. XCIII. B.) *Link, Fil. Sp. Hort. Reg. Ber. p.* 66, *(not Carm. Fl. of Trist. da Cungha, which is a* Polypodium). Ch. Kaulfussii, *Kze. in Linnæa*, xxiii. *p.* 244? — *β. minor;* lobules of the pinnules in the dried plant cochleate.

Hab. "Mexico," (*Link*). Realego, El Equador, *Dr. Sinclair.* Central America, *Barclay.*—*β.* Sierra Madre, N.W. Mexico, *Seemann, n.* 1994.—I am not aware that this is noticed by any author save Link, who describes it from a cultivated plant in the Berlin Garden, and by Kunze in his 'Index Filicum cultarum,' in the 23rd vol. of the 'Linnæa,' who however only changes the name of "*viscosa*," Kaulf. (Link?) to *Kaulfussii*, on the ground that it is not *Ch. viscosa* of Carmichael. Such indeed is the fact; but as Capt. Carmichael's original plant is in my possession, I can testify to its being no *Cheilanthes*, but a *Polypodium*, nearly allied to, if not identical with, *P. rugosulum* of Mr. Brown's Prodromus. Our figure and specific character are taken from native specimens, which, however, seem to differ in no respect from cultivated ones sent from Berlin to the Royal Gardens of Kew. It is a well-marked species, though save in the absence of the glandular hairs, a good deal allied to *Ch. chærophylla*, as far as can be judged from that figure. In the native dried specimens the pinnules and lobes are remarkably convex, in our smaller variety from Sierra Madre particularly so; giving the ramifications quite a beaded appearance.

52. Ch. *leucopoda*, Link; "frond ternately quadripinnate, ultimate pinnules crenato-pinnatifid with scattered hairs above and below, stipes and rachis whitish, hairs viscid." *Link, Fil. Sp. Hort. Reg. Berol. p.* 66. *Kze. in Linnæa*, 1850, *p.* 244.

Hab. Mexico, (*Link*). — "Frond with the stipes scarcely 4 inches long, primary pinnæ an inch and a half, secondary 1 inch, tertiary 4 lines, ultimate ones a line long, with long white spreading hairs on the stipes and rachis."

Link, who alone has described this species as above, and it must be confessed very unsatisfactorily, places it next *Ch. viscosa*, but without offering any remarks on its affinities.

53. Ch. *marginata*, H. B. K.; caudex short thick horizontal clothed with subulate black scales, stipites 2—4—6

inches long and as well as the main rachis ebeneous, fronds 3—6 inches long glabrous thick-membranaceous rather soft and flaccid deltoid-ovate tri-quadripinnate, pinnules all oblong-obovate or subcuneate entire or lobed auricled at the base above and more or less deeply pinnatifid all of them decurrent so as to form a winged rachis, lobes oblong-ovate, sterile pinnules and lobes the broadest and penniveined, all of them crenate at the margin, involucres on the teeth of the crenatures broad membranous suborbicular rarely free (the edge very thin and fringed) mostly combined and forming a continuous lobed or broadly crenated involucre extending all round the margin.—*H. B. K. Nov. Gen. et Sp. Am.* i. *p.* 18, *and* vii. *t.* 669. *Link, Fil. Sp. Hort. Berol. p.* 62. Ch. rufescens, *Link, l. c.* Ch. chærophylla, *Kze. in Linnæa*, xxiii. *p.* 243, *and* 307. Allosorus ciliatus, *Presl, Rel. Hænk.* i. *p.* 59. *Kunze, in Linnæa*, ix. *p.* 56, *and in Poepp. Pl. Exsic. (Herb. nostr.)* Allosorus chærophyllus, *Mart. et Gal. Fil. Mex. p.* 47, *t.* 11.

Hab. Rocky places, Peripe, Andes of Quito, 7000 to 8000 feet elevation, *Humboldt and Bonpland:* and on old walls near Quito, *Jameson, Hartweg, n.* 1513. Andes of Huanuco, Peru, *Poeppig, MacLean.* Mexico, *Hænke;* Juquilla, Andes of the Pacific Ocean and Oaxaca, *Martens and Galeotti, n.* 6367 *and* 6844. Real del Monte and Xalapa, *Dr. Coulter, n.* 1676 *and* 1677. Caracas, *Linden, n.* 508. Venezuela, *Funck and Schlim.* St. Sebastian, Sierra Nevada, Sta. Martha, N. Grenada, and Jamaica, *Purdie.* Tondil and Salto, Argentine Republic, *Tweedie.*—A very remarkable and easily distinguished plant, and pretty widely distributed, even well figured (both by Humboldt and Galeotti), yet strangely misunderstood. Kunze, who distributed Poeppig's *Allosorus ciliatus* under that name, did not seem to be aware that Martens and Galeotti's *Allosorus chærophyllus* was identical with it, for he separates it from *Allosorus*, with the remark "indusia spuria lobulata et sæpius interrupta ad *Cheilanthem* sine dubio delegant." He was familiar with the Mexican and Peruvian plants, yet places them in two different genera. Humboldt's name is very characteristic. Link's *H. rufescens* is appropriate to some states of this plant, which is very variable in colour. There seems no reason why Presl should change Humboldt's specific name to "*ciliata*," unobjectionable as the latter may be in allusion to the generally ciliated edge of the involucres, well represented by Humboldt, but omitted by Martens and Galeotti. The broad involucres, when continuous on each margin, almost meeting at the back, resemble those of *Cryptogramma crispa*, Br.

(*Involucres continuous.* Pteridoideæ).

54. Ch. *deltoidea*, Kze.; "frond triangular subcoriaceous bipinnato-pinnatifid glabrous, pinnæ obliquely ovate, pinnules and segments ovate obtuse with the cuneate base decurrent, stipes smooth, rachises margined and the costules

sulcate above black-purple beneath, involucres marginate crenulated continuous, sori rather broad." *Kunze, in Linnæa*, x. *p.* 535.

Hab. Fissures of rocks, Zilverfountain, Little Namaqua Land, Cape of Good Hope, *Drège.*—"I have seen only three fronds (2½—3 inches long) of this species, destitute of caudex: in habit it resembles small specimens of *Pteris pedata;* but it is bipinnato-pinnatifid. Our *Ch. triangula* differs from this in the tripinnate frond, the pinnæ and pinnules petiolate, in the sulcated stipes, &c. Our *Ch. multifida*, β., *flexa*, differs in the true indusia (indusiis veris) and in the puberulous rachises, &c." *Kze.*—I have myself but a solitary specimen of this from Drège. It appears a good species, with quite pteroid involucres. But one needs copious specimens in different stages of growth to speak with confidence.

55. Ch. *Atherstonii*, Hook.; root? caudex? stipes a span and more long stout and as well as the principal rachis all purple-ebeneous and very glossy, frond deltoid less than a span long everywhere glabrous coriaceous pale green 4-pinnate (pteroid), primary pinnæ ovato-deltoid and as well as the secondary and tertiary pinnæ petiolate the lower distant upper ones more approximate, pinnules sessile (upper ones coadunate) oblong entire or pinnatifid in their lower half, involucres formed of the inflexed margins of the pinnules pale and membranaceous at the edge rarely solitary and single generally coadunate so as to be continuous the edge more or less crenate or lobed.

Hab. District of Somerset, S. Africa, *Mr. Atherstone.* — I possess no species with which I can say this is closely allied among *Cheilanthes;* nor among *Allosorus*, to which this might with about as much propriety be referred. The whole Fern is 12—14 inches long, very hard, rigid, and particularly glossy and stout in the stipes and primary rachises.— Perhaps its nearest ally is Kunze's *Ch. deltoidea*, but that is a very much smaller plant and much less compound. The pinnules of *Ch. Atherstonii* are about 2 lines long and two-thirds of a line wide.

56. Ch. *cuneata*, Link; caudex short creeping, stipes 1—1½ foot long and as well as the main rachis ebeneous glossy grooved on the upper side smooth, frond glabrous subcoriaceous ovate or broad-ovate acuminate 6—12—14 inches long 3—6 inches across tri-quadripinnate, primary and secondary pinnules ovato-acuminate, the rest and the pinnules lanceolate cuneate below all of them decurrent so as to form a narrow green margin or wing on each side the furrow of the rachis, ultimate pinnules shortly but sharply almost pungently acuminate entire or auricled on the upper inferior margin or pinnatifid with lanceolate entire sharp lobes, all slightly serrated, involucres marginal or subentire pale membranaceous punc-

tiform or linear often quite continuous slightly waved and jagged or crenated. *Link, Fil. Sp. in Hort. Berol. p.* 63. *Kze. in Schkuhr, Fil. Suppl. p.* 73, *t.* 36. Otholoma, *Link.* Cassebeera, *J. Sm.* Allosorus, *Pr.* Allosorus pulchellus, *Mart. et Galeot. Fil. Mex. p.* 47, *t.* 10, *f.* 2.

Hab. Mexico, Province of Oaxaca, elevation above the sea 7,000 feet, *Galeotti, n.* 6560. Cerro de Pinel (*n.* 1450), Sierra Madre, N.W. Mexico, *Seemann, n.* 1932. Sierra San Pedro Nolasco, Talca &c., *Jurgensen, n.* 670.—The frequently continuous sori would lead to the opinion that this should be ranged in *Pteris* or *Allosorus:* other specimens, and I cannot say depending on age, have quite the small rounded punctiform involucres of *Cheilanthes*, yet gradually upon the same specimen more or less combined and continuous all round a lobe or pinnule. As *Cheilanthes*, it is extremely distinct from any other: the pinnules and lobes are harsh and rigid and almost cuspidate, so as to resemble those of some *Polystichum.* Our specimens from Sierra Madre are very much larger and more divided than those of Kunze's figure: the fronds and the stipes too are very brittle. Some of my specimens correspond so exactly with Martens and Galeotti's figure and description of their *Allosorus pulchellus*, that there cannot be a question of the identity of the two.

57. Ch. *profusa*, Kze.; roots slightly creeping scaly, stipites 2—4 inches. long and as well as the rachises hispid with spreading subulate paleaceous scales, frond oblong-lanceolate acute subcoriaceous pinnate, pinnæ often opposite glabrous, uppermost lanceolate approximate subcoadunate entire, lower ones ovate or deltoid acuminate distant very shortly petiolate deeply pinnatifid at their base sometimes pinnate, pinnules and laciniæ lanceolate rarely slightly lobed or pinnatifid often curved a little upwards, costæ hispid with appressed narrow subulate scales, involucres of the same texture as the frond continuous, — from the same root another form of frond appears smaller with fewer and more approximate pinnæ which are ovate blunt and only sinuato-lobate the edges membranaceous subcrenulate. *Kunze, in Linnæa*, xviii. *p.* 535, (1850), *p.* 244, *et in Schkuhr's Fil. Suppl. p.* 33, *t.* 17. Notochlæna, *Pr.*

Hab. Namaqua Land, *Drège.* — My specimens of this are from Zeyher, n. 4627. These exhibit only the usual form as figured and described by Kunze. But our cultivated plants produce from the same root the form which Kunze makes "Var.? *β.*, *minor;* pinnis approximatis abbreviatis inciso-pinnatifidis costis rachibusque calvescentibus:" and which if seen separately would naturally be taken for a distinct species. It is well figured by Kunze in the plate above quoted, fig. *c.* In the coriaceous texture of the frond and the continuous involucres it has an affinity with certain Cape species of *Pteris* or *Allosorus.*

58. Ch. *cornuta*, Kze.; "frond lanceolato-linear bipinnate, pinnæ ovate approximate the lowest subopposite petiolate, pinnules sessile subternate bi- or trifid oblong obtuse curved coriaceous, sori at length diffuse, stipes and rachis rigid (setaceo-paleaceous at length) naked." *Kze. in Linnæa*, x. *p.* 534.

Hab. Worcester District, Cape of Good Hope, *Ecklon and Drège.*—"A species not to be compared with any unless with several contracted forms of *Ch. hastata*; but the rigidity of the frond, its nearly linear outline and diffuse sori readily distinguish it."—Kunze's specimens would appear to have been far from good. If those of Drège himself in my herbarium are to be depended upon, this is nothing more than, not even a variety of, *Ch. profusa*, next before which Kunze places it, but without the slightest allusion to its affinity with that species. My specimen is marked by Drège "*Cheilanthes cornuta*, Kze., *a*." The slight curvature upwards of the pinnules which suggested, I apprehend, the specific name, is common to the normal state of *Ch. profusa*: and there can be no question of the identity of the two, unless Drège has made some mistake.

59. Ch. *pulchella*, Bory; roots cæspitose, stipites 4—6 inches long purple-brown glossy scaly below, fronds ovate or deltoid-ovate acuminate tripinnate coriaceous glabrous, primary pinnæ all more or less caudate at the apex, lowest pair dimidiato-deltoid their lowest inferior pinnæ elongated pinnate or pinnatifid, pinnules or lobes oblong or linear-oblong obtuse entire, involucres membranaceous intramarginal continuous brown transversely wrinkled and lobed at the edge. (TAB. XCIV. A.) — *Bory in Willd. Sp. Pl.* v. *p.* 456. *Webb and Berth. in Phytogr. Canar. p.* 453, *t.* 252, (*excellent*). Cheilanthes n. sp.? *Schimp. Coll. It. Abyss. n.* 1431.

Hab. Teneriffe, *Bory*. Canary and Palma, *Webb et Berthelot, Dr. Lemann*. Madeira, *Webb et Berthelot*. Rocks in the valley of Mai Mezano near Djeladjeranne, Abyssinia, *Schimper*.—Schimper's specimens are smaller than most (but not than all) of Mr. Webb's and Dr. Lemann's specimens of this very pretty fern; but in no other respect different. We have thus another station to add. Messrs. Webb and Berthelot had observed on its geographical station, "Fortunatarum et Maderæ! cives est pulchra species autochton." — It would be a *Pteris* or *Allosorus*, of the group which produce intramarginal sori, but for the transversely wrinkled involucres indicating what is considered the normal character of *Cheilanthes*,—interrupted sori.

60. Ch. *coriacea*, Desne; "cæspitose (2—3 decimetr.), stipites terete ferruginous clothed with hairs and attenuated scales, fronds bipinnate simply pinnate above, pinnæ opposite, lower ones bifid, the segments approximate linear-oblong obtuse entire coriaceous furrowed on the upper side and opaque,

beneath in the younger state covered by the ferruginous shining indusium." *Decaisne, Plantes d'Arabie, p.* 190.

Hab. Haguef, Arabia Felix, *Botta.*—"Allied to *Cheilanthes pulchella.* This plant, the *Ch. pulchella*, together with a new Abyssinian species" (not further noticed by the author), "exhibit, in their younger state, the pinnules wholly covered by an indusium, which is smooth and shining and gives to the inferior surface a coppery appearance. Notwithstanding this character, these three plants belong to the group of *Ch. farinosa*, remarkable in the form, the consistence and colour of the stipes. The mode of division of the fronds and the bifurcation of the inferior pinnule, while giving to these plants a peculiar character, unite them much more intimately with *Cheilanthes*, than with *Allosorus*, to which genus M. Presl refers them."—Of this I have seen no authentic specimen, and am unable to refer it from the description to any known species.

61. Ch. *viridis*, Sw.; "fronds bipinnate, pinnules ovate entire, terminal ones larger ovato-lanceolate or subhastate, stipes smooth." *Sw.—Sw. Syn. Fil. p.* 127. *Willd. Sp. Pl.* v. *p.* 456. Adiantum viride, *Vahl, Symb. p.* 104. Pteris viridis, *Forsk. Arab. p.* 186. Allosorus hastatus, *Pr.*

Hab. Arabia Felix, *Förskahl.* — I am unacquainted with this species, which Swartz and Willdenow refer to *Cheilanthes*, but which others refer to *Pteris*, and Presl, perhaps justly, considers identical with his *Allosorus hastatus* (*Pteris* Sw.)

62. Ch. *hirsuta*, Link; "frond tripinnate oblong in circumscription, pinnules lanceolate obtuse crenulate attenuated at the base, involucre breaking into a thin lax tomentum (indusio in tomentum tenue laxum abeunte) and covering the whole under side of the pinnules." *Link, Hort. Berol.* ii. *p.* 41; *Fil. Sp. Hort. Berol. p.* 63. *Kze. in Linnæa,* xxiii. *p.* 244. Othonoloma, *Link, olim. (Kze.)*

Hab. Mexico, (*Kunze*). — "Frond a foot and more long, pinnules 2—6 lines long, outer ones (externæ) very long, a little more than a line wide." —I am unacquainted with this plant, but Kunze retains it as a species of *Cheilanthes*, and Link says of it that it has the habit of *Pteris* and especially of *Pteris leptophylla*, Sw. (formerly *Cheilanthes spinulosa*, Link, according to Presl). Link further adds under this species, "*Ch. crenulata*, Hort. Ber. ii. p. 42, vix ab *Ch. hirsuta* diversa. *Ch. crenatam* quoque colimus; an *Ch. crenata*, Kze., Linnæa, ix. p. 84? Planta infans frondibus e cormo parum ultra poll. longis bipinnatifidis, pinnulis oblongis acutis crenatis et incisis in rachin alatam decurrentibus, stipite badio. Fructus nondum protulit. Habitus sequentis (*Ch. microphyllæ*, Sw.)"

63. Ch. *canescens*, Kze.; "frond coriaceous lanceolate pinnato-bipinnatifid, pinnæ sessile rather remote divergent oblong lower ones nearly opposite ovato-triangular superior alternate all deeply pinnatifid obtuse pubescent above canohirsute beneath, laciniæ ovate or short-oblong obtuse, the

margin reflexed crenato-sinuate, teeth soriferous, indusia marginal membranaceous, sori minute at length spreading, rachis subflexuose and the ascending short stipes sparingly paleaceous pubescent pale, caudex creeping paleaceous." *Kunze, En. Fil. Mex. in Linnæa*, xiii. *p.* 143, *in Sckhuhr, Fil. Suppl. p.* 71, *t.* 35.

Hab. Mexico, *Ehrenberg.* — A very pretty and distinct species, judging from Kunze's figure, with an exceedingly pale straw-coloured stipes. The pinnæ very uniform, deeply pinnatifid with oblong segments, and in the principal figure at least having a continuous involucre like *Pteris* or *Allosorus*.

64. Ch. *aspera*, Hook.; roots densely tufted, stipites 2—3 inches long and as well as the main rachis and lower half of partial rachis ebeneous rough with minute points and partially scaly, scales pale ash-colour, fronds 4—4½ inches long lanceolate bipinnate subcoriaceous pale green, primary pinnæ distant below petiolate from a broad base ovato-acuminate, pinnate below pinnatifid above, pinnules and segments broad oblong when sterile, linear when fertile, entire or slightly auricled on each side at the base crenato-undulate towards the margin and there especially rough with short harsh white hairs often bi-tripartite or geminate, involucres continuous formed of the reflexed margins pale and membranous at the edges crenate and transversely undulate, on the ridges of the undulations the white rigid hairs are particularly apparent. (Tab. CVIII. A.)

Hab. Collected in an Expedition from Western Texas to El Caso, New Mexico, *Chas. Wright*, 1849.—This has a good deal the habit and general appearance of *Cheilanthes canescens* of Kunze, and has as much claim to be placed in the genus as that species, the continuous involucre being however that of *Pteris* or *Allosorus*. Our plant is much more delicate and graceful, the stipes and main rachises ebeneous, the primary pinnæ again truly pinnate. But the remarkable character exists in the transversely waved margin of the fertile pinnæ and segments, and the harsh rigid simple or bi- and sometimes tripartite white hairs seen on the ridges, especially of the undulations. It is assuredly a very distinct and new species.

65. Ch. *caudata*, Pr. "fronds bipinnate subtriangular glabrous, pinnules pinnatifid, lateral lobes roundish, terminal one linear, sori confluent, involucres obsolete, rachis and stipes glabrous." *Br. Prodr. p.* 156.

Hab. Tropical New Holland, *Brown.* — I have seen a specimen of this in the Banksian Herbarium, and know of nothing exactly corresponding with it: yet, without more specimens for examination I would not venture to describe it, or to say it is decidedly distinct. It has some affinity with small specimens of *Ch. tenuifolia*, but it has very elongated terminal pinnules, both at the main apex of the frond and on the branches. It may

safely be placed in the pteroid group of *Cheilanthes*: — the sori are sometimes distinct, more often continuous.

66. Ch. *intramarginalis*; roots tufted fibrous, stipites crowded 4—5 inches long scaly with black deciduous scales, below ebeneous as well as the rachis (which is downy on one side), fronds 4 inches to a span long deltoideo-ovate coriaceo-membranaceous pinnato-pinnatifid below bipinnatifid, pinnæ very patent remote opposite sessile dimidiately ovate acuminate the extremity long-caudate, lobes or segments linear or linear-oblong the upper ones decurrently confluent those on the lower half of the pinnæ the longest especially in the lowest pair where they are sometimes again pinnatifid, involucres broad membranaceous brown continuous (rarely interrupted) subcrenated transversely wrinkled. — Pteris intramarginalis, *Kaulf. in Schlecht. et Cham. Fil. Mex. Linnæa*, v. *p.* 613. *Kunze, Analect. Pteridogr. p.* 21, *t.* 17, *f.* 1. Allosorus, *Pr.* Pteris inframarginalis *et* Pt. fallax, *Mart. et Galeot. Fil. Mex. p.* 53. Cheilanthes Prionopteris, *A. Braun, MS.* (fide Kunzii). Cassebeera, *J. Sm.*

Hab. Mountains of Mexico, Xalapa, Oaxaca, Vera Cruz, &c., *Schiede and Deppe, Karwinski, Martens and Galeotti, n.* 6329, 6389, *and* 6467, *Linden, n.* 40 *and n.* 1531. Guatemala, *Skinner.* — It is not unwillingly that I place this Fern, which has almost invariably continuous involucres (though thin and membranaceous, transversely wrinkled and more or less crenated) in *Cheilanthes*: but it has so close an affinity with our *Ch. nitidula* that I am unwilling to separate them generically. The general aspect is similar, the texture and venation (elevated beneath the frond), the opposite and here remarkable dimidiate pinnæ, and above all, the intramarginal insertion of the involucres (more striking in this species than in *Ch. nitidula*), are alike in both. Hence Kunze was led to observe of this, "fructificatio ab illa *Pteridis*, ubi sori et indusia margini contigua, paullisper recedit:" and in regard to Al. Braun having referred our present plant to *Cheilanthes*, he remarks "quamquam *Cheilanthes* firmis characteribus nondum nitatur, tamen nostram filicem illi adnumerare indusia continua et sori non discreti vetant." The habit is certainly rather that of a *Pteris*.— The serrated margin, distinct from the involucre, is well represented by Kunze in his 'Analecta Pteridographiæ,' and scarcely less correctly in Martens and Galeotti's *Pteris fallax*, which is assuredly identical with our plant, though that author does not seem to be aware of the existence of serratures in *Pt. intramarginalis*, the species immediately preceding his *Pt. fallax*.

67. Ch. *nitidula*; caudex short creeping stout, stipites 2—5 inches long very numerous and crowded hispid with subulate deciduous chaffy dark brown scales and as well as the rachis (which is downy on one side) ebeneous, frond 3—4 or rarely 5 inches long subdeltoideo-oblong acuminate (sterile ones broader) coriaceo-membranaceous pale green gla-

brous pinnato-pinnatifid below sub-bipinnate, pinnæ approximate nearly opposite broad-lanceolate dimidiate (the inferior half being broadest) deeply pinnatifid nearly to the rachis lowest pair again subpinnate and the secondary pinnæ pinnatifid, lobes all oblong entire or sinuate gradually coming to a sharp point the lower base decurrent the lowest inferior lobes the longest, involucres subintramarginal continuous rarely here and there interrupted broad flat membranaceous brown close-pressed frequently lobed and crenated and transversely wrinkled. *Hook. Ic. Pl.* x. *ined.* Pteris nitidula, *Wall. Cat. n.* 89. Allosorus nitidulus, *Presl.*

Hab. Kamaoun, *Dr. Wallich.* Rocks, Simla, *Dr. T. Thomson.* Pundkester, N. India, *Mr. Edgeworth.* — This, like many others we have placed under *Cheilanthes*, has nearly an equal claim to be considered an *Allosorus*, as it is considered by Presl, or a *Pteris*, according to Wallich, its discoverer. It has no small affinity with *Ch. pulchella* and *Ch. cuneata*, but is quite distinct from both, and apparently a rare species. We possess Dr. Wallich's original specimens from the alpine districts of Kamaoun, gathered by his collector, Mr. Blinkworth; others from Mr. Edgeworth, and we find excellent specimens in Dr. Thomson's rich Himalayan Herbarium. No description of it however has yet been published. In the younger fronds the veins are very obscure: in the older ones they are prominent or elevated beneath. Sterile fronds are broader and more membranaceous: hence Presl has placed it in a division of *Allosorus* "frondibus dissimilibus pinnulis laciniisve angustioribus integris," along with his *Allosorus* (Cryptogramma, *Br.*) *crispus*.—Dr. Wallich's specific name, we presume, refers rather to the glossy character of the stipites and rachis than to the fronds, which we find to be somewhat opaque.

(Pteroideæ,—*clothed with yellow powder beneath*).

68. Ch. *chrysophylla;* roots fibrous, stipites tufted 2—4 or 5 inches long purple-ebeneous hispid with sparse black subulate scales denser below, fronds subcoriaceous deltoid-ovate acuminate 3—4 inches long dark olive-green and glabrous above golden-yellow and powdery beneath pinnate, pinnæ mostly lanceolate the lowest pair deltoid all pinnatifid, lowest inferior segments of the lowest pinnæ lanceolate subsinuate, the rest oblong or ovate entire or crenulate, involucres formed of the reflexed margin of the frond continuous even to the apex of the segments but crenate, the edge thin membranaceous (not ciliated). Ch. chrysophylla, *Hook. Ic. Pl.* x. *t.* 901, *(ined.)*

Hab. Bare rocks, Kala-Panee, Khasya (1850), *Drs. Hooker and Thomson.* — It is impossible not to see the striking affinity between this species and the *Ch. farinosa*, Kaulf. (p. 77), and figured in the 'Icones Filicum,' t. 77, insomuch that, at the first aspect, save in the very different colour of the powdery substance on the underside of the frond (here bright gold)

the two might be considered identical. But independently of the crenated margin of the segments of the frond in the present *Cheilanthes*, the involucres will afford abundant marks of distinction; in *Ch. farinosa* wholly membranaceous rounded and more or less combined at the base (in that sense often continuous): here the involucres are formed of the reflexed margin of the frond itself and of the same texture, altogether continuous, but the edge membranaceous and merely crenated; never toothed or ciliated. It is the regular crenation that induces me to refer this and the following species to *Cheilanthes*, rather than to *Pteris* (or Allosorus), and assuredly among the latter genus I know of none that assimilates with this.

69. Ch. *ochracea;* roots fibrous, stipites crowded very short clothed with oblong obtuse spreading chaffy scales and as well as the rachis dark ebeneous purple, fronds submembranaceous broad-lanceolate scarcely a span long dark green slightly hairy above beneath densely clothed with a golden-ochraceous pulverulent substance pinnate, pinnæ almost always opposite lanceolate obtuse lowermost subdeltoid all of them pinnatifid nearly to the rachis, segments oval obtuse entire or obscurely crenate ciliated, involucres continuous narrow formed of the reflexed margin of the frond the edges membranaceous and crenated (not ciliated). *Hook. Ic. Plant. t.* 904, *ined.* Allosorus ochraceus, *Hook. in Benth. Plantæ Hartwegianæ, p.* 55.

Hab. Mexico; moist shady places, Morelia, *Hartweg, n.* 418. — In this very distinct Fern the involucre is narrow, continuous, and quite pteroid, but crenated, as if formed of originally distinct but confluent sori: so that, as will be seen in Mr. Bentham's work above quoted, my views were not quite decided whether to place it in *Allosorus*, *Nothochlæna*, or *Cheilanthes*. I am here led to refer it to the latter genus from many points of similarity with our last species, *Ch. chrysophylla*, in the similarity of involucres in the two, and especially in the presence of the golden powdery substance clothing the whole under surface of the frond. In the species now before us this pulverulent substance is so dense, the colour so approaching ochraceous, that it looks as if it had been smeared with that well-known paint, yellow-ochre, of a particularly bright hue. In the shape of the frond, too, lanceolate (not deltoid) this differs considerably from *Ch. chrysophylla*, and no less in the thinner and more membranaceous texture, in the villous upper side and ciliated margins, in the very short stipites, and above all the large spreading blunt chaffy scales which clothe the latter. I am not aware that this species has been detected by any person save Mr. Hartweg.

ADDENDA, &c.

At p. 74, n. 30, *for* "*Hypolepis Gardneri*, Hook.," *read* H. *monticola*, and add as a synonym, "Cheilanthes monticola, *Gardn. in Hook. Ic. Plant. t.* 477."

At p. 77, n. 3, under *Cheilanthes farinosa*, Kaulf., insert

Hab. *a.* and *β.*, both found at Simla, *Dr. T. Thomson.*

At p. 78, n. 5, under *Cheilanthes rufa*, Don, insert

Hab. Ascent of Mahadel, Chuma, in Khasya, *Drs. Hooker and Thomson;* less red than Dr. Wallich's specimens, and, on the under side of the frond, whitish.

At. p. 80, n. 6, under *Cheilanthes Dalhousiæ*, Hook., insert

Hab. Simla, *Dr. T. Thomson.*

At p. 81, n. 9, under *Cheilanthes fragrans*, Webb et Berth., insert

Hab. Peeshwar Hills, *Major Vicary.*

At p. 81, under *Cheilanthes squamosa*, n. 8, insert

Var. *β.*? *brachypus*, Kze. in Linnæa, xviii. p. 340; pinnæ and pinnules very obtuse subparallel hoary-villous above, the lower ones smaller, stipes very short. *Kze.* Ch. brachypus, *Kze. in Linnæa*, xxiii. *p.* 243 *and p.* 307.

β. Mexico, tropical, *Leibold.*—In the 'Linnæa' for 1844, this was given by Kunze, doubtfully, as a variety of *Ch. squamosa;* but subsequently, in 1850, it is considered by that author, a good species, though I am not aware if any specific character is published. Dr. Kunze observes of *Ch. brachypus*, l. c. "Cultura ex sporis repetita tamquam species propria probata. Ut varietatem *Ch. squamosæ*, dubie quidem, in describendis filicibus Leiboldianis (Linnæa, xviii. p. 340) plantam breviter exposui." — A specimen we possess from Kunze as this plant seems identical with our *Ch. squamosa;* but the stipes is rather shorter. Mexico is quite a new habitat for that species: and the same has likewise been found, with longer stipites at Sonsonati, Guatemala, by *Mr. Skinner;* and in Surinam by *Dr. Hostmann.*

At p. 82, after n. 9, should have been inserted

9.* Ch. *andina*, Hook.; caudex short rooting scaly, stipites tufted 1—2 inches long and as well as the main and partial rachis partially scaly dark ebeneous glossy, fronds 1½—2 inches long deltoideo-oblong subacuminate tripinnate subcoriaceous glabrous dark brown (when dry), primary pinnæ (especially the lower ones) distant deltoid-ovate, secondary ovate-oblong pinnatifid (rarely again and only those of the lower primary pinnæ) pinnate, lobes small rotundate entire or obscurely crenate, involucres formed of the inflexed margin of the lobules membranaceous or entire at the edge and more or less interrupted.

Hab. Lofty Andes of Peru, *John MacLean, Esq.* — A small and I must confess rather an obscure plant, possessing few or no satisfactory distinguishing characters, of a dingy brown colour in its dry state, with somewhat the aspect of *Ch. fragrans*, near which perhaps it might be placed. The whole plant does not exceed 3½ inches. Stipes and rachises very ebeneous black. Pinnules in 7—9 almost opposite pairs: the lowest pair distant, all glabrous, and all with an evident recurvature of the margin forming the involucres which are thin and membranaceous only at the edge. Sori rather large, so as to be by no means covered by the involucres.

At p. 84, under *Ch. microphylla*, in line 12, insert " (Tab. XCVIII. A.) "

At p. 98, under *Ch. Szowitzii*; *β. Stocksii*, insert " roots highly aromatic;" and

Hab. Peshawur Hills, *Major Vicary.*

Dubious Species of Cheilanthes, *or to be removed from the Genus.*

Cheilanthes Sellowiana, *Pr. Tent. Pterid. p.* 160.

Ch. digitata, *Presl, in Herb. Meyen. et l. c. p.* 160.

Ch. Meyeniana, *Presl, in Herb. Meyen. et l. c. p.* 160.

Ch. auriculata, *Link et Kze. is* Allosorus, *Pr.*

Ch. hastata, *Kze. is* Pteris, *Sw.* Allosorus, *Pr.*

Ch. hastæfolia, *Schrad. is* Allosorus, *Pr.*

Ch. ferruginea, *Willd. is var. β. of* Notholæna rufa, *according to Presl, Reliq. Hænk.* i. *p.* 19.

Ch. candida, *Mart. et Galeotti, is* Nothochlæna.

Ch. contigua, *Wall. Cat. is* Onychium.

Ch. contracta, *Kze. is* Allosorus, *Auct.*

Ch. angustifolia, *H. B. K. is* Onychium, *according to Kze.*

Ch. crenulata, *Spr. is* Allosorus cæspitosus, *Pr.*

Ch. crenulata, *Link, according to Galeotti is* Allosorus ciliatus, *Pr.*

Ch. decomposita, *Willd. is* Allosorus angustifolius, *Pr. and* Onychium angustifolium, *Kze.*

Ch. heterophyllus, *Willd. is* Allosorus heterophyllus, *Pr.*

Ch. gracilis, *Kaulf. is* Allosorus, *Pr.*, Pteris, *Mich.*

Ch. macrophylla, *Kze. in Linnæa*, xxiii. *p.* 244, *et p.* 307, *is* Allosorus, *Pr.*

Ch. leptophylla, *Br. in Salt's Abyssinia, is* Onychium melanolepis, *Kze.*

Ch. *fuscata*, Bl.; " frond bipinnatifid membranaceous ferruginous with the stipes and rachis hairy, pinnæ alternate oblong obtuse pinnatifid, laciniæ digitato-pinnatifid, stipes brown. *Blume, En. Fil. Jav. p.* 136.

Hab. Moluccas, *Blume.*—" A *Ch. ferruginea*, Willd., laciniis digitato-pinnatifidis distincta."—We know no more of this plant than is given above. The *Cheilanthes ferruginea*, Willd. and Spreng. and Link and Kaulf., is considered by Presl and Kunze as identical with a variety of *Nothochlæna rufa*, Kaulf.

5. Cassebeera, *Kaulf.*

(Hook. Gen. Fil. tab. LXVI. A.) *Martius, Presl, and J. Smith, in part.* Adianti Sp., *Smith, Swartz.*

Sori subglobose or elliptical intra-marginal, frequently 2 confluent ones from as many veinlets on an emarginated lobe. *Involucre* inserted within the margin, of the same shape as the sorus, opening towards the costa, generally oblong or elliptical, membranaceous, brown, pressed down upon the sorus.—*Tropical or extratropical, small* Ferns *of* Brazil, *inhabiting dry rocky places, having a rather short, horizontal, densely scaly* caudex *or* rhizoma. Stipites *tufted, rather long in proportion to the fronds, ebeneous as well as the* rachises *and the* midrib *beneath.* Fronds *of a singularly thick, coriaceous, hard texture, quite glabrous, tripartite pedate or pinnate, even bipinnate, the* pinnæ *oblong or linear, simple and lobed or again pinnate, rarely and only below bipinnate, with the segments rotundate.* Veinlets *forked, quite internal, so that not a trace of them can be seen without dissection.* Sori *generally* 2 *combined (on the termination of* 2 *veinlets) on the lobules of those species which have trifoliate or simply pinnate fronds, so that each pinna bears as many sori as there are lobes: while in the bi- or (rarely tri)- pinnate species the pinnules bear but one simple or double sorus, though the involucre is sometimes cleft.*

The Genus *Cassebeera* was established by Kaulfuss upon a remarkable-looking Brazilian Fern, the *Adiantum triphyllum*, Smith; to which he added a new species, *Cassebeera pinnata*, equally from Brazil, and an undoubted congener. A third species of the Genus was detected by the late Mr. Gardner in the Diamond district of Brazil, and is figured in the 'Icones Plantarum,' under the name of *Cassebeera gleichenioides*, Gardn. In this the frond is more compound, but the habit and fructification are the same as in the other *Cassebeeræ*. Thus limited it is a natural and a good Genus. Presl however in his 'Tentamen Pteridographiæ' has placed in it the *Cheilanthes pteroides* of Swartz and the present work, which it must be confessed has considerable affinity in the fructification and in the texture of the frond, but not in habit. Mr. J. Smith takes another view of the Genus *Cassebeera* altogether; restoring indeed *Cass. pteroides* to *Cheilanthes:* but uniting with the original species of Kaulfuss, the *Pteris pedata* and *argentea*, Linn., *Pteris hastata* of Swartz, our *Cheilanthes intramarginalis*, together with *Cheilanthes farinosa, cuneata, microphylla, tenuifolia* &c. of authors and of this work: so different are the opinions of botanists who have most devoted attention to the Family, on the subject of Genera of Ferns. Few however are more guided by attention to natural affinities than Mr. J. Smith: and he says "On comparing the Adiantoid section

of *Pteris*, and part of *Cheilanthes* with the original species of *Cassebeera*, I find that several of the species of both these Genera (*Pteris* and *Cheilanthes*) so well agree in habit and in structure of the sori, that I have been induced to place them under *Cassebeera*." Martius in his admirable illustration of *Cass. pinnata* (Ic. Plant. Crypt. Brasil. p. 91, tab. 61) dwells wholly upon its distinction from *Adiantum* and *Lindsæa*, with which it has little in common. It may be very difficult to define the Genus accurately in words; but I am clearly of opinion that if retained at all, and no one seems to doubt the propriety of so doing, it should be restricted to the original species:—if abolished it would be difficult to say which of the established Genera should receive them. I cannot agree to the observation of Presl, "Genus hoc (*Cassebeera*) magis artificiale quam naturale est."

* *Fronds digitate or pedate.*

1. Cass. *triphylla*, Kaulf.; frond tripartite or digitatedly pedate, segments lanceolate crenato-lobate.—*Kaulf. Enum. Fil. p.* 216. *Hook. Gen. Fil. t.* 66, A. Adiantum triphyllum, *Smith, Ic. ined. t.* 74. *Swartz, Syn. Fil. p.* 120. *Willd. Sp. Pl.* v. *p.* 428.

Hab. Buenos Ayres, *Commerson*. Monte Video and South Brazil, *Sellow, Isabelle, Tweedie*. Porto Alegre, *Mr. Fox*, (*in Herb. nostr.*)—It is quite a mistake in those who have described this Fern as if it were triphyllous, or trifoliolate, or ternate: so far from there being 3 distinct leaflets or pinnæ, the normal form I suspect to be pedate, that is deeply divided into 3 segments (or tripartite), with the lateral segments again divided, but never into separate pieces. The true nature of this frond is given at t. 66, A., of our 'Genera Filicum,' in the more usual form of the plant, when the lower lateral segments are suppressed: but there are never distinct leaflets or pinnæ as in the following species.—The caudex is stout, horizontal, 2 inches long, clothed with subulate, black, glossy scales; on the underside with numerous descending wiry fibrous roots; above throwing up many crowded, wiry, almost black, ebeneous, flexuose stipites, 3—6 inches long, terminated by the, usually, deeply tripartite, small, coriaceous frond. When dried without pressure, the sides are apt to be revolute, and narrow: when perfect the segments are exactly lanceolate lobato-crenate: less frequently the lower side of the lateral lobes or segments sends down a lobe, constituting a pedate frond. The colour when dry is a pale brown, traversed in every one of the lobes, for about half its length, by an intensely black, shining costa, which gradually becomes fainter, till it entirely disappears. In the young and thinner fronds, when held up between the eye and the light, and with the aid of a lens, the forked rather closely placed lateral veins, or veinlets, may be seen, from 2 to 4 terminating under each involucre, according to the size of the lobe bearing the involucre, or to the size of the involucre itself which covers them. I cannot find that of the sori there are, as Presl and others express it, constantly, "duo sub qualibet crena emarginata frondis," though it is very common for the lobe or lobule which bears the sori to be emarginate.

** *Fronds pinnate or bipinnate.*

2. Cass. *pinnata*, Kaulf.; frond pinnate, lower pinnæ again divided or pinnated, pinnules petiolate elongated linear-oblong acute crenato-lobate, lobes broad generally emarginate (duplicato-lobate).—*Kaulf. Enum. Fil. p.* 217, *t.* 1, *f.* 11. *Martius, Ic. Plant. Crypt. Bras. p.* 91, *t.* 61. *Kunze, Analecta Pteridograph. p.* 37, *t.* 24. *Spreng. Syst. Veget.* iv. *p.* 118.

Hab. South Brazil. Province of St. Catherine, *Chamisso, Sellow.* Minas Geraes, *Langsdorff.* Stony shady places, Province of St. Paul, Brazil, Serra de Natividade, *Gardner, n.* 3556.—A much larger, stouter and more robust plant than *Cassebeera triphylla.* The caudex is similarly horizontal, bearing the same wiry roots. The stipites are less crowded; the rachis a span to a foot long, less glossy and ebeneous than the preceding species. The frond is simply pinnated, as shown by Kaulfuss and Kunze and as in our specimens from Natividade: but not unfrequently bipinnate, as represented by Martius, and as in our specimen from Sellow. The pinnæ and pinnules are 2 inches and 2½ inches long: and the black midrib runs up almost to the apex. In our best specimen from Gardner the scales of the caudex are bright tawny.

3. Cass. *gleichenioides*, Gardn.; fronds bipinnate, pinnules petiolate linear-elongated deeply pinnatifid or even pinnated, lobes or ultimate pinnules orbicular-subquadrate when dry recurved the margin (beyond the involucre) thickened entire. —*Gardn. Plant. Exsicc. Bras. n.* 5295. *Hook. Ic. Plant.* vi. *t.* 507.

Hab. Bushy rocky places, Diamond district, Brazil, *Gardner, n.* 5295. —Imagine an unusually large specimen of *Cass. pinnata* more divided (*i. e.* more bipinnated than usual), and instead of having the shallow lobes to that species, to have those lobes, or the sinuses of those lobes, cut down to the very rachis into roundish lobes or ultimate pinnules with the margin or edges of those pinnules thickened, and you have an idea of the structure of the present species. The scales of the caudex of this as well as of the preceding species, are bright tawny, not black as we find them in *Cass. triphylla.* Our tallest fronds of this are 6—7 inches long, and the deeply divided, convex and nearly opposite ultimate pinnules of a rounded form, have quite the appearance peculiar to some *Gleicheniæ*, whence Mr. Gardner's appropriate specific name. We find the capsules upon long stalks, which seem to be characteristic of the other species. Although this is found in tropical Brazil, it is probably a mountain plant: and all the species may be said to belong to the temperate rather than tropical regions.

(At p. 108, line 4, for *Allosorus pulchellus*, read *All. decompositus*).

6. ONYCHIUM, *Kaulf.*

(HOOK. GEN. FIL. TAB. XI.) Leptostegia, *Don.* Cheilanthis Sp., *Wall. H. B. K.* Pteridis Sp., *Hook. et Grev. Desv.* Trichomanis Sp., *Thunb.* Lomariæ Sp. Scolopendrium, *Hamilton.*

Sori linear, placed opposite each other, on each side of a midrib of the segment or pinnule and at or near the margin, or rather the margin of the pinnule is often suddenly rolled in and there bears the involucre, giving an appearance of the margin being extended beyond the involucre; these sori are inserted upon a linear receptacle running within the fold of the margin. *Involucres* linear, and being opposite, and each occupying nearly the whole space between the rachis and the margin, they have the appearance of opening in the middle by a longitudinal suture; white or yellow, membranaceous.—*Tropical or subtropical* Ferns. Roots *fibrous, tufted.* Fronds *stipitate, varying in size, decompoundly pinnatifid, the primary divisions narrow, 1-nerved, the fructified portion broader and penniveined, the veins simple, extending to the longitudinal receptacle which bears the capsules, and confluent with it.*

In the Genus now under consideration we have examples, among the suborder *Pterideæ*, of plants with fructification bordering more closely upon the normal state of *Pteris* and *Lomaria*; that is, continuous and not broken up into scales, or not deeply crenated and jagged at the margin: but each fertile lobe or pinnule has its margin occupied by an uninterrupted sorus and involucre. Kaulfuss however selected two species which have a peculiar habit, copiously ramified with narrow divisions, the ultimate segments narrow and tapering like a claw (ὄνυχιον) bearing the involucres so opposite to each other and so close that they almost appear like one, opening in the middle (as in *Scolopendrium*), and to these he gave the generic name of *Onychium.* His species are *O. auratam*, Kaulf. (Pteris chrysocarpa, *Hook. et Grev. Ic. Fil. t.* 107, and *O. Capense*—incorrect as to locality (Trichomanes Japonicum, *Thunb.*) These Presl has caused to merge into his *Allosorus*, and in the groupe or division having "frondes dissimiles." With the exception of Presl, our writers on Ferns have considered the Genus worthy to be retained, and with little or no modifications. Don, indeed, before Kaulfuss' 'Enumeratio' could have reached his hands, formed a new Genus, *Leptostegia*, from the *Scolopendrium lucidum*, Hamilton, MS., and this is a congener of *Onychium.* Kunze has extended the Genus by uniting with it the *Cheilanthes angustifolia*, H. B. K., *Lomaria microptera*, Br. in Herb. Carmich., *O. melanolepis*, Kze. (Cheilanthes *leptophylla*, *Br. in Salt's Abyssinia*), and a new species from Cuba, *O. strictum.*

1. O. *auratum*, Kaulf.; roots of densely tufted fibres, stipites cæspitose a span to a foot and more long hispid with a few narrow scales only at the base and as well as the rachises everywhere pale brown or straw-colour glabrous and glossy, frond a span to a foot or a foot and a half long ovato-lanceolate acuminate submembranaceous but firm and glossy very compound four times or more pinnatisected (primary and secondary divisions pinnated) segments all narrow linear subcuneate short (in the sterile portions) ultimate ones acute entire or inciso-dentate, segments all pointing upwards 1-nerved, fertile segments elongated siliquiform especially the terminal ones and mucronate, sori linear-elongated occupying the whole back of the fertile segments, involucres golden colour meeting at their edges. *Kaulf. Enum. Fil. p.* 144. Lomaria aurea, *Wall. Cat. n.* 38. L. caruifolia, *Wall. Cat. n.* 39. L. decomposita, *Don, Prodr. Fl. Nep. p.* 14. Pteris chrysocarpa, *Hook. et Grev. Ic. Fil. t.* 107. Pteris siliculosa, *Desv.* Allosorus auratus, *Presl.*

Hab. East Indies and Malay Islands. Manilla, *Chamisso.* Luzon, *Cuming, n.* 38; *Thos. Lobb, n.* 452. Java, (ex Herb. Miquel. n. 21). Bootan, *Griffith, Booth.* Nepal, Kamaon (probably its western limits), *Hamilton, Wallich.* Khasya, *Simons, n.* 246; *J. D. Hooker, and Dr. T. Thomson.*— Our figure in 'Icones Filicum,' above quoted, does ample justice to this plant as far as an entirely fructified specimen is concerned, and it is certainly one of the most beautiful of Ferns, whether in that or in the sterile state (of which latter we now possess copious specimens), when the fronds have quite a different appearance, being everywhere multifidly cut into copious, crowded, narrow, short and linear or somewhat cuneated segments, tapering at the base, and resembling the very compound leaf of some umbelliferous plant (whence Dr. Wallich's name *caruifolia*). Other specimens again are partly (above) fertile after the manner of *Osmunda regalis* or *Allosorus* (Ceratodactylis, *J. Sm.*) *Karwinskii* of Kunze, and apparently by a transformation of the laciniæ of the pinnæ and pinnules, which become larger, more elongated, entire and mucronated, often an inch long, and so resembling the pods of some *Arabis* as to suggest to Desvaux the specific name of "*siliculosa*." The under side of these is a beautiful golden colour, but less deep in our specimens from Khasya and the Malay Islands, in consequence, probably as Mr. J. Smith suggests, of the moister climate.

I quote Don's *Lomaria decomposita* with doubt, because he not only does not notice the remarkable colour of the fructifications, but because he distinguishes his *Leptostegia lucida* generically from this plant, whereas no botanist could see these two species without pronouncing them to be identical as to Genus. The usual colour of the fronds, especially the sterile fronds, of our plant, is to be pale light yellow-green (when dry), but we have specimens from Assam with very dark foliage and with narrower and more elongated segments.

2. O. *lucidum*, Spreng.; caudex creeping? stipites six-

inches to a foot and more long and as well as the rachises pale, brown or stramineous, frond a foot and more long ovato-acuminate membranaceo-coriaceous glossy 3—4 times pinnatisected (primary and secondary divisions pinnated) segments uniform or nearly so in the sterile and fertile ones, all narrow linear a little tapering below ultimate ones moderately long all gradually acuminated (not mucronate even in the fertile ones), sori oblong short occupying nearly the whole of the back of the segments, involucres white or cream-colour membranaceous meeting at the back. *Spreng. Syst. Veget.* iv. *p.* 66. *Hook. Gen. Fil. t.* xi. Cheilanthes lucida, *Wall. Cat. n.* 69. Cheilanthes contigua, *Wall. Cat. n.* 69. Leptostegia lucida, *Don, Prodr. Fl. Nep. p.* 14. Scolopendrium lucidum, *Hamilton's MS. (fide Don).*

Hab. East Indies and Kamaon, Nepal, *Hamilton, Wallich, Lady Dalhousie, Dr. T. Thomson, Strachey and Winterbottom* (elevation 700—7500 feet), *n.* 1, 2. Mussoorie and Gurwal, *Dr. T. Thomson.* Simla, *Lady Dalhousie, Edgeworth, Griffith.* Mishmee, *Griffith.* Khasya, *T. Lobb.*—In the sterile specimens of this plant, there is a great resemblance to those of the preceding (*O. auratum*), but the fronds, though varying much in size, are generally broader in proportion to their length, with commonly more spreading pinnæ and the ultimate segments more entire. In fructification the differences are very apparent: the sori being formed on the unchanged segments, they are consequently very small in comparison, short, oblong, and of a pale white or cream-colour, never golden coloured. The *Cheilanthes contigua* of Dr. Wallich has the fronds a little broader and the segments narrower, and they form no permanent or tangible variety.

Kaulfuss' representation of a fertile portion of the frond of his *Onychium Capense* (O. Japonicum, *Kze.*, our next species) is a faithful representation of our plant.

3. O. *Japonicum*, Kunze; "fronds flexuose decompound, branches triplicato-pinnate, the segments oblong acute." *Kaulf.* — *Kunze, in Schkuhr, Fil. Suppl. p.* 11. Onychium Capense (*omitting the station, "Cape of Good Hope"*) *Kaulf. Enum. Fil. p.* 145, *t.* 1, *f.* 8. Trichomanes Japonicum, *Thunb. Fl. Jap. p.* 340. Cœnopteris, *Sw. Syn. Fil. p.* 89.

Hab. Japan, in Kosido, Satsuma, Nagasaki and elsewhere, in mountain districts, *Thunberg.*—"Frond a foot and a half and more long, weak, flexuose, decompound, above triplicato-pinnate, the apex subcaudate. Branches very remote, slender, triplicato-pinnate, pinnules dentato-laciniate, the segments oblong acute bearing the fructification. Sori inserted at the margin of the laciniæ under the apex in the sinus of the indusium. Indusia submarginal, membranaceous, white, connivent (limbis conniventia), at length opening with a longitudinal suture."—With this species I am unacquainted, except from the description, and from the figure of Kaulfuss, which shows an apex of a branch, which, as already observed under *O. lucidum*, seems in no way different from that plant. Schlechtendal, in his 'Adumbr. Fil. Promont. Bon. Sp.' p. 40, expressed his suspicion that the *Onychium*

Capense of Kaulfuss was not of African origin. Kunze, in 'Linnæa,' x. *l. c.* observed that "he had seen a specimen of Kaulfuss' *O. Capense* in Roemer's Herbarium, found by Thunberg," and, afterwards, having ascertained that it was from Japan, and in reality Thunberg's *Trichomanes Japonicum*, he very properly restored that specific appellation. It is now a question whether our *O. lucidum*, like many other northern Indian forms, may not extend its range as far as Japan. Thunberg's description, brief as it is, would seem to confirm such an opinion. "Frons supra decomposita glabra, stipite torto sulcato. Pinnulæ ultimæ acutæ subtrifidæ. Fructificationes solitariæ in ultimis laciniis; membrana tegens tenuissima alba." *Thunb. l. c.*

4. O. *angustifolium*, Kunze; "fronds bipinnate, pinnules linear acuminate sessile entire and as well the rachis glabrous." *H. B. K. Kunze, in Schkuhr, Fil. Suppl.* ii. *p.* 11. Cheilanthes angustifolia, *H. B. K. Gen. et Sp. Am.* i. *p.* 17. *Spreng. Syst. Veget.* iv. *p.* 116. *Presl.* Ch. decomposita, *Willd. Suppl. (according to Sprengel).*

Hab. Mexico, on the Mountain Jorullo, at between 3000 and 4000 feet of elevation.—"Fronds 4 inches and more long, bipinnate; pinnæ alternate, 2 inches long. Pinnules linear, acuminate, sessile, entire, glabrous, an inch and a half to two inches long, scarcely a line wide, lower ones sometimes bipartite, middle nerve prominent beneath, naked. Universal and partial rachises glabrous, naked, somewhat winged, greenish. Stipes 8 inches long, naked, nearly terete, castaneous, shining. Sori marginal, at length confluent. Sporangia cinnamon-brown. Indusium continuous, arising from the margin of the frond, fimbriato-crenate, diaphanous, glabrous. Perhaps a species of *Pteris*."—I am not acquainted with this plant, which Kunze refers to *Onychium;* but I am not aware that any further information is given respecting it, beyond what I have here copied from Humboldt.

5. O. *strictum*, Kunze; caudex 2—3 inches long oblique rather stout nodose throwing out wiry roots more copiously from the upper extremity, stipites numerous partially scaly a span to a foot long crowded from the apex of the caudex and as well as the slender rachises pale straw-colour glossy, fronds a span long submembranaceous green glabrous opaque ovate decompoundly pinnatisected, the segments all very narrow and acute opposite entire or bi-trifid subcuneate, tertiary rachises winged: the fertile laciniæ are a little larger and wider sharply acute bi- or trifid beyond the fructification, bearing the sori on the disk short linear-oblong nearly white. —*Kunze, in Schkuhr's Fil. Suppl.* ii. *p.* 11.

Hab. St. Jago de Cuba, on Mount Leban, *Linden, n.* 1870.—This is a very distinct and well marked species, and with all the characters of *Onychium*, which is thus found in the New as well as the Old World. The caudex or rhizoma of my specimen is singularly nodose or tuberculated, and one that apparently elongates upwards and bears the fronds altogether from the extremity. It is remarkable for the great length of the stipites in

comparison of the fronds, and for the opposite segments, of which the ultimate ones have one or two or three sharp points. Involucres small but swollen, as it were, from the copious capsules of the sori.

6. O. *melanolepis*, Dcne.; caudex short a little creeping with rigid and appressed black scales, stipites tufted from the apex of the caudex 3—6 inches long very slender and as well as the rachises flexuose canaliculated glabrous glossy stramineous (when dry), frond membranaceous 3—6 inches long veined glabrous pale green ovate tripinnato-pinnatedly-sected sterile laciniæ narrow cuneate tri-quinquefid and incised, the lacinulæ sublinear apiculate, fertile ones oblong cuspidate bearing the pale membranaceous almost white involucres on the disk, the apex acute free entire. — *Decaisne, Pl. de l'Arabie Heur. Archiv. du Mus.* ii. *p.* 189. *Kze. Schkuhr, Fil. Suppl.* ii. *p.* 9, *t.* 104, *f.* 2. * *Hook. Ic. Plant.* x. *t.* 9. Cheilanthes leptophylla, *Br. in Salt's Abyssinia, App.* iv. *p.* lxv. *(name only).* Allosorus cuspidatus, *Jaubert et Spach, Illust. Pl. Orient.* iii. *p.* 1, *t.* 201.

Hab. Abyssinia, *Salt, H. Schimper, n.* 1672. South Persia, rock of Mount Pire-zend, between Shiraz and Kazeroum, *Aucher-Eloi, n.* 5488. Caves in the Island of Kareh, Persian Gulf, and at Dalechy, *Kotschy, n.* 10 *and* 198.—A small and very distinct species, long known to that Chief of Botanists, Mr. Brown, and named by him, without description, in the Appendix to Salt's Abyssinian travels. More recently it has been taken up and both described and figured by continental botanists, 1st, as *Allosorus melanolepis*, Dcne.; and 2ndly, as *Allosorus cuspidatus*, Hochstetter. By Kunze it has been properly referred to *Onychium*. It is a plant of very delicate texture, like unusually slender specimens of *Gymnogramma leptophylla.*

O. Krebsii, *Kunze, in Linnæa,* x. *p.* 504, from Graham's Town, South Africa, proves to be a *Scolopendrium*, according to the same author, on an examination of more perfect specimens, and the error has since been corrected in the 18th volume of the 'Linnæa,' and in the Supplement to Schkuhr's 'Filices,' where it is figured and described as *Scolopendrium Krebsii.*

O micropterum, *Hook.* — Under this name, in the 'Genera et Sp. Fil.' I referred to a plant of the late Capt. Carmichael in my Herbarium, bearing the name of *Lomaria micropteta*, Br. (MS.) It is with regret I am compelled to say that the plant is no longer to be found in my Herbarium, accidentally mislaid probably: so that I am unable to describe it and to offer any further opinion respecting it. Kunze includes it in his Catalogue of the species of *Onychium;* but only on the above authority.

7. LLAVEA, *Lagasca* (*not Liebm.*).

Ceratodactylis, *J. Sm.* (HOOK. GEN. FIL. TAB. XXXVI.*) Allosorus, *Kze.* Botryogramme and Ceratodactylis, *Fée.*

Sterile and *fertile pinnules* different on the same plant. *Sori* linear or oblong, occupying nearly the whole length of the pinnated veins of the upper pinnules of the frond which are much altered and elongated, siliquiform. *Involucre* formed by the incurved, continuous, membranous, dilated margins of the pinnules, covering and concealing the fructifications (as in *Cryptogramme*).—*A solitary* species of *Mexico.* Caudex *short, thick, and, as well as the lower part of the long, flexuose, straw-coloured* stipes, *scaly.* Frond *ample, 3-pinnate;* rachises *flexuose, slender.* Sterile pinnules *ovato-cordate, thin, but subcoriaceous, firm, the* veins *closely pinnated, forked, slender, prominent, the margin cartilaginous finely spinuloso-serrated,* fertile pinnules *confined to the upper portion* (*and forming a* panicle), *narrow, elongated, nearly teretè, acuminated, less rigid than the* sterile pinnules; *the margins membranaceous, involute, and forming the* involucres, *finally spreading.*

This is in every respect a very striking plant, closely allied in its fructifications to *Cryptogramme*, Br., but with a very different habit, in some respects approaching *Osmunda.* It is this peculiar habit mainly that justifies the separation from *Allosorus* or *Pellæa.*

1. Ll. *cordifolia*, Lagasca, Gen. et Sp. Pl. 1816, p. 33; Dict. des Sc. Nat. xxvii. p. 89. Ceratodactylis osmundioides, *J. Sm. in Hook. Gen. Fil. t.* 36. *Fée, Gen. Fil. p.* 228. Allosorus Karwinskii, *Kze. in Linn.* xiii. *p.* 138. *Benth. Plant. Hartw. p.* 54. *Kze. in Schkuhr, Fil. Suppl. p.* 7, *t.* 4. *Hook. Ic. Plant. Rar.* iv. *t.* 387 *et* 388. Botryogramme Karwinskii, *Fée, Gen. Fil. p.* 166, *t.* 15 C.

Hab. Mexico, *Lagasca, Liebold, Liebmann;* Oaxaca, *Karwinski, Galeotti,* elev. 5–7000 feet; Barranca de la Encarnacion, near Zimapan, *Hartweg, Dr. Coulter, n.* 1684; Amatenango, Chiapas, *Linden, n.* 1522; Sierra San Pedro Nolasco, Talea, etc., *Jurgensen, n.* 680.

Having, after the fullest consideration, deemed the present fine plant worthy of forming a genus, distinct from *Allosorus*, to which I had been disposed to refer it, the next step was to consider the priority of name for the genus; and it

* In this figure of Mr. Bauer, as observed by Mr. J. Smith, the fold of the involucre has been mistaken for an additional receptacle, and represented accordingly.

will be allowed, I think, on all hands, that the excellent Lagasca, hitherto altogether overlooked, has claims to that; his brief but correct character being published as above stated in 1816, forty years ago. Probably, if we may infer from the generic name, M. La Llave was the first to discover the plant, which appears to be wholly confined to Mexico; and it certainly does not associate well with the other species of *Allosorus* of Presl (*Pellæa* of Link, and of this work), whatever may have been in the mind of the original constructor of the genus, Bernhardi, in his miserably defined character. It is strange that M. Fée should not have recognized in Bauer's figure (Gen. Fil. l. c.), and Mr. J. Smith's description accompanying it, his own genus *Botryogramme* (hence he has this plant under two different genera and different names); and still more strange that he should place these far away from each other and from *Cryptogramme*, to which, in the fertile portions of the fronds, and in the general nature of the fructification, it has a very close affinity. In its large size and in the form of the pinnules, and in the upper leaflets only being fertile, it is remarkably distinct. If not a scandent plant, it seems to have a rambling habit, with the main and secondary rachis often flexuose; the barren pinnules have a thickened, narrow, almost cartilaginous margin, which is spinuloso-serrate.

8. CRYPTOGRAMME,* *Br.* (1823.)

(HOOK. GEN. FIL. TAB. CXV. B.) Allosorus sp., *Bernhardi.* Allosorus and Gymnogramme, *Presl.* Phorolobus (1827) and Cryptogramme, *Desv.* Phorolobus, *Fée.* Cryptogramme and Allosorus, *Mettenius.* Pteris, *L. MS.*, *Sm.* Osmunda, *L.*

Sterile and *fertile fronds* different from the same root. *Sori* short, or oblong and linear, situated upon and towards the apex of the pinnated veins, occupying a greater or lesser length of those veins, in age concealing the whole back of the pinnules. *Involucre* continuous, formed of the revolute, membranous, dilated margins of the pinnules, which almost meet at the back, concealing the fructification, except in the very mature state.—*A solitary* species, *inhabiting the moist temperate and northern regions both of the new and old world, in rocky and mountainous situations.* Caudex *short thick subrepent, sometimes apparently wanting.* Roots *fibrous.* Stipes *stramineous.* Fronds *small, densely tufted, subcoriaceous: of 2 kinds from the same root:* outer ones *barren, bi-tripinnate, with somewhat ovate or obovate entire or lobed* pinnules, *which are crenato-serrate or deeply cut and pinnatifid;* veins *pinnated;*—fertile fronds, *taller than the sterile,*

* I have ventured to write this word *Cryptogramme*, rather than *Cryptogramma;* from γραμμη, ης, *linea;* and not γραμμα, ατος, *litera scripta*, and which would require a neuter adjunct, never given to this word.

bipinnate, with linear or linear-oblong, somewhat siliquiform pinnules, *pinnatedly veined.*

Unquestionably the first who separated this from the genus *Pteris* was Bernhardi, and he included *Pt. crispa*, L., in his *Allosorus*, with the very imperfect character "*Sporangia* cathetogyrata, sessilia, subaggregata. *Hyposporangia* subcommunia, margine libero subpellucida;" but that genus *Allosorus* has been made a receptacle for Ferns of very varied structure, according to the different views of authors respecting the limits of the genera, especially of those included in this work under the name of *Pellæa*. Presl retains the plant under consideration in his genus *Allosorus*, with the majority of the species of which it has little in common, and, strangely enough, he removes the *Cryptogramme acrostichoides* of Mr. Brown, and *C. Brunoniana*, Wall., which we have ventured to consider as not *specifically* distinct, far away in his genus *Gymnogramme*. *Phorolobus* of Desvaux, adopted by Fée, is of more recent date than Mr. Brown's *Cryptogramme*, unless Desvaux has published it in some earlier work than I am aware of, viz. the 'Mém. de la Soc. Linnéenne' (if he has he gives no reference to it in this work), and he quotes Mr. Brown's *Cryptogramme* in the same volume and in the same essay as a different genus. His character, moreover, is no improvement on Bernhardi's, and he includes a species from China, one from the West Indies, and a third from Australia!

In taking the bold step to unite several supposed species into one, as I have here done, contrary to the judgment of the most distinguished botanists, it is necessary that I offer explanation, especially when, in conjunction with my friend Dr. Greville (Icones Filicum), I published as distinct two of the species I propose to abolish, viz. the N. American *C. acrostichoides*, Br., and the Northern Indian *C. Brunoniana**, Wall. I would however call attention to the remark made, firstly, under *C. acrostichoides:* "Mr. Brown has drawn up the character of the genus so as to include our *Pteris crispa*, which he nevertheless considers a doubtful species of *Cryptogramme*. To us, however, there appears no generic difference; and the fertile fronds have the closest similarity in almost every particular except the shorter sori (in *C. crispa*). In the sterile fronds the pinnules are much broader, and never wedge-shaped in the plant before us (*C. acrostichoides*)." Under *C. Brunoniana* we observed, "This, though from so remote a country (Himalaya), is yet almost identical with that of Nootka Sound and subarctic America (*C. acrostichoides*); the only difference exists in the sterile fronds," &c. If indeed there was a manifest difference in the sori, so as to constitute different genera, between *C. crispa* and *C. acrostichoides* and *Brunoniana*, as Presl, and lately Mettenius, maintain is the case, the first could upon no account be united with the two latter; but I think I may appeal to the magnified representations of the sori of *C. crispa*, as given in our 'Genera Filicum' and in Fée's 'Genera Filicum,' and of those of the two kinds in the 'Icones Filicum,' in support of my views that there is no available distinction; and I have copious specimens before me at this moment of our British species (*C. crispa*), in proof that, as in *C. acrostichoides*, these sori occupy so much of the veins, and are "ita approximati, ut discus totus pinnulæ explanatæ capsulis maturis tectus est, et in hoc stadio filix species *Grammitidis* vel *Acrostichi* quasi evadit," *Br.* Our specimens, gathered in an advanced state in Galloway, Scotland, have the involucres quite spreading, and exposing the sori occupying nearly the whole veins.

When an old plant is found in a very distant part of the world from its previously known locality, one is apt to look upon it as something new; and, as is

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* *Cryptogramme Jamesoni*, Hook. and Grev., noticed under this species in Ic. Fil., is *Cheilanthes marginata*, H.B.K. (and of this vol., p. 105), though omitted in the synonyms of that plant.

the case with the Cedar of Lebanon and the Cedar of Himalaya, it is very difficult to remove the impression once made upon the mind, although no tangible character to distinguish them can be detected.

I shall now consider the different variations or forms of our plant, as much as possible under their respective countries, for I allow that the mass of specimens from Europe, Asia, and America, exhibit some slight differences, often not easily defined.

1. C. *crispa.*

a. *forma Europæa;* rather slender subflaccid, pinnules of the sterile fronds of two kinds, subobovate deeply cut into 2–5 oblong segments, rarely elliptical and pinnatifido-serrated, those of the *mature* fertile fronds linear-oblong with the margins or involucres more or less recurved, sometimes quite spreading, and then the pinnules are elliptical.—Cryptogramme crispa, *Br. in Rich. App. to Franklin's First Journ. p.* 54. *Hook. Gen. Fil. t.* 113. *Hook. et Arn. Brit. Flora, ed.* 7, *p.* 59, *t.* 10, *f.* 5. Phorolobus crispus, *Desv. in Mem. de la Soc. Linn. de Paris,* p.* 291, "*t.* 11" (*Pritzel*). *Fée, Gen. Fil. p.* 130, *t.* 6 D. Allosorus crispus, *Bernh. Neues Journ. für die Botanik, part* 2, *p.* 36. *Presl. Mettenius.* Allosorus minutus, *Turcz. Plant. Imag. et Descr. Fl. Russ. p.* 9, *t.* 3 (small var. fertile frond partially barren). Pteris crispa, *Linn. MS. Sm. E. Bot. t.* 1160. *Willd. Sp. Pl.* v. *p.* 395. Pteris Stelleri, *Gmel.* Allosorus Stelleri, *Rupr. Ledeb. F. Ross.* iv. *p.* 526. Pteris minuta, *Turcz. Cat. Pl. Baic.* Osmunda, *L. Sp. Pl. p.* 1522. Acrostichum, *Vill.* Onoclea, *Hoffm.*

Hab. General throughout Middle and Northern Europe, especially in mountain regions and moist districts, as far north as Lapland and Lake Baikal, Siberia;† south to the Pyrenees, Spain; Asturias, *Durieu;* Sierra Nevada, *Boissier*, elev. 8–9000 feet; and to Mount Olympus in Asia Minor, *Sibthorpe.*

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* Pritzel, 'Ic. Bot. Ind. locuplet.,' quotes vol. vi. t. 11, but my copy of this little-known and most ill-assorted work has no title-page, no date, and no tab. 11, and no *figure* of this plant. Several of the plates of this volume bear date 1827; and this, as far as I can learn, is about the date of the publication of the genus.

† The authority for the Siberian plant is Ruprecht and Turczaminow, as given in Trautvetter's 'Plantarum Imagines et Descriptiones Floram Rossicam Illustrantes,' and Ledebour, in 'Flora Rossica.' This latter author gives four species of *Cryptogramme* ("*Allosorus*") natives of the Russian dominions, and these are divided into three groups:—1. "*Cryptogramme*, R. Br.; frondes steriles et fertiles dissimiles. *Sori* secundum totum decursum venularum pinnulæ, cujus margo primum demum explanatus." Under this there are two species, *A. foveolatus*, Rupr. (A. crispus, *Kaulf. Enum. Fil.*), from Unulashka and Kadjak, "an idem ac *Cryptogramma acrostichoides*, R. Br.?" and *A. Sitchensis*, Rupr. (Cr. acrostichoides, *Bong.*, from Sitcha). 2. "*Allosorus*, Bernh.; frondes steriles et fertiles dissimiles. *Sori* versus apicem venularum pinnulæ, cujus margo semper involutus." To this section our author refers *Pteris crispa*, L., stated to be found only in Russian

Notwithstanding that our learned friend, Mr. Brown, framed his character of *Cryptogramme* with a view to include our *C. crispa*, "quæ dubia quidem species, ob soros abbreviatos potius subrotundos quam lineares," we are disposed to consider it by no means generically distinct, and not even specifically so, either from that gentleman's *C. acrostichoides*, or from the *C. Brunoniana* of Dr. Wallich. It is true that the chief distinction between the plant now under consideration and the two latter is, that *C. crispa* has often the fertile pinnules when mature narrower, with smaller or shorter sori and fewer sporangia, but that is very variable in different specimens, and these sori do not extend and become so completely confluent over the back of the pinnules as generally to force back the involucres, and thus to present a broader surface of pinnule, as is more or less common to the other two kinds; but this is a character not unlikely to depend on soil and climate, and which, in other Ferns, would not be considered of specific, much less of generic value. Another peculiarity in this state of *C. crispa* is, that its habit is more slender than the continental forms, though even this is by no means universal; some of our specimens are very stout and firm.

b. *forma Indica;* erect stout somewhat rigid, pinnules of the sterile fronds varying as in the European form, those of the *mature* fertile fronds rather broad-oblong with the margins (or involucres) spread open (not permanently revolute). —Cryptogramme Brunoniana, *Wall. Cat. n.* 396. *Hook. et Grev. Ic. Fil. t.* 158. *Mettenius.* Gymnogramme Brunoniana, *Presl, Tent. Pterid. p.* 219. Phorolobus Brunonianus, *Fée, Gen. Fil. p.* 131.

Hab. N. India. On the higher alps of Kamoun, *Blinkworth* (*Wallich*), *Messrs. Strachey and Winterbottom*, elev. 12,000 feet; Balti, N. W. Thibet, Shayak Valley, elev. 9000, *Dr. Thomson.* Above Simla, *Col. Bates.* Choor, N. India, *Mr. Edgeworth.* Interior of Sikkim-Himalaya, elev. 11–13,000 feet, *Hooker and Thomson.*

I place this variety next to the European form, because, in the aggregate of specimens before me, the sterile fronds are exactly as in our European plant, that is, of two kinds, the one kind with the obovate segments deeply divided, serrated, single-nerved, the other with the pinnules elliptical, deeply serrated and pinnatedly veined, whereas the fertile pinnules more resemble those of the following

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Lapland. 3. "*Homopteris*, Rupr.; frondes omnes consimiles, pinnæ superiores fertiles, inferiores plerumque steriles." To this is referred *A. minutus*, Turcz. et Trautv. (Pteris Stelleri, *Gmel.*, Pteris minuta, *Turcz. in Cat. Baik.*), native of Siberia. With regard to the supposed species from Kadiak (Kadjak) and from Sitcha, I can only say that our specimens from those very countries are identical with our European form. The true *Allosorus* or *Cryptogramme crispa* will not belong to his second section, if the character "cujus (pinnulæ) margo semper involutus" is of any importance, as I have shown above. In regard to his third section, it is evident that its main or principal character depends upon the "frondes omnes consimiles, pinnæ superiores fertiles," &c.; but I have Spanish specimens of *Cr. crispa* with the upper half of the pinnules of the frond fertile, and the lower sterile, and Scotch ones with the lower half fertile and the upper half sterile. It is only by means of an extensive series of specimens from various localities that we can show that these trifling differences, made so much of by those who see specific distinctions in every deviation from the normal form of a plant, can be duly appreciated.

(American) form, although they are not quite so large; but, while the majority of the Indian specimens are as here described, there are others that are more slender and flaccid, with fronds and narrower fertile pinnules, in short, in all particulars resembling our own native specimens.

c. *forma Americana;* erect generally rather stout, pinnules of the sterile fronds usually elliptical or ovate and more or less deeply and regularly serrated, those of the *mature* fertile fronds rather broad-oblong with the margins (or involucres) much spread.—Cryptogramme acrostichoides, *Br. in App. Franklin and Richardson's First Journ. pp.* 39 *and* 54. *Hook. et Grev. Ic. Fil. t.* 29. *Fée, Gen. Fil. p.* 131. Allosorus crispus, *Kaulf.*

Hab. N., and chiefly N. W., America, Hudson's Bay Company's territories, between 56° and 60° north, *Sir John Richardson.* First found by *Mr. Menzies* at Nootka Sound. Abundant on dry rocks between the grand rapids and great Falls of the Columbia, and on the mountains of Macgillivray's River, and sparingly in the Rocky-Mountains near the source of the Columbia, 1825, 6, and 7, *Douglas.* (The specimens from these stations may be considered the types of the *C. acrostichoides*, Br., and were the first recognized specimens referred to *Cryptogamme;* and they have the broad, flattened, mature, fertile pinnules, and generally elliptical, rigid, sterile ones.)—Island of Kodiak (*Ruprecht*); North-west coast of America, both at Kodiak and Sitcha, *Barclay;* Unalashka, *Chamisso;* Sitka, *Mertens* e *Rupr.;* all these, and specimens just received (March, 1857) from J. A. Lapham, Esq., gathered on Isle Royale, Lake Superior, by W. D. Whitney, Esq.,—the only locality known within the U. States,—possess quite the European form.

9. PELLÆA, *Link* (1841), *Fée.*

ALLOSORUS, in part *Presl*, scarcely of *Bernhardi.* (HOOK. GEN. FIL. TAB. V., and TAB. CXV. A., as PLATYLOMA, *J. Sm.*) Pteridis *sp.*, *Linn.* and *others.*

Sori linear or oblong, occupying the upper portion of the simple or forked veins, at length becoming confluent and forming a continued more or less broad marginal line of fructification. *Involucre* marginal, generally narrow continuous, formed of the dilated more or less changed and often membranaceous margin of the frond, at first revolute, at length frequently spread open, so as to expose the entire fructification.—Ferns *tropical* or *subtropical and of temperate regions.* Caudex *often creeping.* Fronds *simple and palmate or pedate, or pinnate, or more generally bi-tripinnate or decompound,* mostly of a harsh and rigid character and when dry of an olive-brown colour. Veins *pinnate, free, mostly inconspicuous and sunk in the thick and opaque substance.* Stipes *more or less elongated,* and together with the straight

or flexuous rachis mostly ebeneous, glabrous and glossy, or more or less clothed with chaffy hairs or scales.

The Ferns which I now bring under the genus *Pellæa* of Link, I have been accustomed, in my miscellaneous writings on Ferns, to refer to *Allosorus*, a genus suggested by Bernhardi, maintained and greatly extended by Presl, and more satisfactorily circumscribed by Kunze. But it must be acknowledged to have undergone so many changes and rejections that I am not sure if Bernhardi would acknowledge any of the species now generally referred to it, as belonging to his genus *Allosorus*. We have elsewhere, in discussing the genus *Cryptogramme* of Brown, quoted Bernhardi's definition of *Allosorus*, and that author further remarks ('Neues Journal für die Botanik,' vol. i. part 2, p. 36), "The genus *Allosorus* includes all the *Adianta spuria* of Swartz, besides *Adiantum pusillum*, Willd. (Pteris acrosticha of *Balbis*,—Cheilanthes fragrans of this volume, p. 81), "*Pteris crispa*, and probably *heterophylla*, Sw. I have given it the name in consequence of the diversity in the grouping of the *sporangia*" (thus those who alter the name to *Allosurus* do so in error). "In some they are mostly solitary, as in *Allosorus pusillus*, in others they are clustered. In some there is only one to each *hyposporangium*, in others several."—Now as Swartz has no group or division of "*Adianta spuria*," it may admit of doubt as to what is here meant by the term, and Fern writers seem to consider it to mean species of *Cheilanthes*. One thing is certain, that the Linnæan *Pteris crispa* is not mentioned as if it were considered the type of the genus; and we cannot but think that so ill-defined a genus as this of Bernhardi, is better abolished. And such seems to be the opinion of others, or they only maintain it for *Pteris crispa*. Professor Link,* in 1841, established the genus *Pellæa*,† or the legitimate species of *Allosorus* of Presl and Kunze, and Mr. J. Smith,‡ in 1842, published his genus *Platyloma*, and transfers the *Allosori* just mentioned, in part at least, to that genus, and the rest to *Cassebeera* of Kaulfuss. In fine, M. Fée, in his elaborate 'Genera Filicum,' gives the preference to *Pellæa*, and we gladly follow him.

If we consider the *fructification*, the difference between *Pteris* and *Pellæa* is this; that whereas in the former the sori arise from a longitudinal continuous receptacle in the axis of the involucre, in *Pellæa* the sori are in reality separate, having their origin on the apex of the veins, more or less covered when young by the involucre, but eventually becoming confluent, so as to form apparently a continuous marginal sorus. It is true this is too often a microscopical character, which few are able to avail themselves of; but happily there is a habit which, in many Cryptogamic plants, comes to our aid as a secondary character of great importance. "On les reconnaît" (the species of *Pellæa*, says M. Fée), "à la première vue à l'épaisseur des lames, souvent opaques et à la couleur verte olivâtre qu'elles prennent en se desséchant. Les stipes et les nervures principales ont cette consistance crustacée fragile et cette couleur noire luisante, si remarquable dans les *Adiantum*. Elles ne produisent que bien rarement des écailles frondulaires, et leurs dernières divisions tendent à la forme linéaire, ou se terminent en pointe." Still it must be confessed that many of these marks are inconstant, and

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* 'Filicum Species in Horto Regio Berolinensi cultæ.'

† From πελος vel πελλος, *niger*, *fuscus*, "stipes rigidus, badius, unde Pellæam dixi" (Link). It is a little unfortunate that there should have been many years earlier (1818) a *Pellia*, named in honour of a learned Florentine Advocate, *Pelli*, given to the Epiphyllous group of Jungermannia among *Hepaticæ*: a genus however, if known to Link, probably not adopted, even at the time his *Pellæa* was enounced: for Endlicher, in his 'Genera Plantarum,' published 1836–1840, refers to it as not generally received.

‡ In Hook. Bot. Journal, vol. iv. p. 159 and 160.

unless the peculiar character derived from the position of the sori be considered and be constant, there is but little that will enable us to distinguish them from some species of *Pteris* on the one hand, and from those species of *Cheilanthes* which have less interrupted sori on the other. Nor is it more easy to define the exact limits of the species, so variable are they in the form of the pinnæ in different stages of development and even on different parts of the same frond. We trust our figures will be found useful to the student in the determination of the species.

No acknowledged *Pellæa* (or *Allosorus*) is known to have anastomosing veins.

* *Fronds more or less pedate.*

1. P. *pilosa;* small, fronds subcordiform, fertile ones deeply subquinquelobately pedate (hence in a sense pinnate) coriaceous opaque, primary lobes ovate petiolate deeply bipinnatifid, segments narrow-oblong entire, rachis and costa (beneath) hairy, sterile ones quinquelobately pedate primary lobes broad pinnatifid ultimate lobes short very obtuse upper surface subglabrous beneath clothed with copious chaffy hairs, stipes and rachis ebeneous more or less paleaceo-hispid. (Tab. CXIV. B.)—Pteris pilosa, *Poir. in Encycl. Méth.* v. *p.* 717. *Sw. Syn. Fil. p.* 163. *Willd. Sp. Pl.* v. *p.* 362. Cheilanthes heterophylla, *Willd. Herb.* Allosorus heterophyllus, *Presl, Tent.* (*name only*).

Hab. "Isles Maurices" (*Herb. Lamarck.*); Isle of Bourbon, *Herb. Mus. Paris.* (*in Herb. Nostr.*)

I had the pleasure to receive specimens of this rare plant from the Paris Museum, under the name of *Cheilanthes heterophylla*, Willd. It does not appear to be anywhere described under that name, and is clearly the *Pteris pilosa* of Poiret, from the "Isles Maurices" (which probably includes Bourbon, for it seems unknown in the Mauritius. It is allied in general structure to our *P. geraniifolia*, and to our var. *b. columbina* of *P. lomariacea;* but the fertile frond is more compound and pinnated, and the sterile fronds are clothed with chaffy hairs.

2. P. *geraniæfolia*, Fée; small glabrous, root cæspitose, fronds cordiform ternate and pedate subcoriaceous opaque, primary lobes broad-lanceolate pinnatifid or usually bipinnatifid, terminal one cuneate at the base, secondary ones lanceolate, ultimate segments ovato-lanceolate entire and as well as the sinuses acute, stipites elongated and as well as the main rachises ebeneous.—*Fée, Gen. Fil. p.* 130. Pteris geraniifolia, *Raddi, Fil. Brasil. n.* 110. *Hook. Ic. Plant. Rar.* x. *t.* 915. Pteris Pohliana, *Presl, Tent. Pterid. p.* 145. Pteris pedata, *Kze. in Linnæa*, x. *p.* 522 (*not Linn.*). Pellæa pedata and P. palmescens? (*name only*), *Fée, Gen. Fil. p.* 130. Pt. pedatoides, *Desv.* Pt. Mysorensis, *Heyne in Wall. Cat. n.* 87. Pteris concolor, *Langsd. et Fisch. Ic. Fil. p.* 19, *t.* 21.

Hab. Brazil; about Rio, *Raddi and others*. S. Brazil, *Sellow*. Santa Marta, Columbia, *Purdie*. Venezuela, near Tovar, *Fendler* (*Pl. Venez. n.* 92). Madagascar and Mauritius, *Bojer*. Cape of Good Hope, *Menzies, Drége*. Nilghiri, E. Indies, *Heyne* (*Wallich*), *MacIvor, Gideon Thomson, Esq*. Luzon, *Cuming*. Marquesas, *Langsdorff*. Volcano, Owhyhee, *Macrae*. Fiji Islands, and Island of Aneiteum, *Milne* (*Voyage of H.M.S. Herald*). Galapagos, *Douglas*.—It is very excusable in any one who at a first glance shall refer this plant to some of the common and more compound forms of *Pteris* (Litobrochia or Doryopteris of authors) *pedata*, or still more in any one who shall unite with it our *Pteris Beecheyana* of this volume, and the more so as the opacity of the fronds renders it very difficult to distinguish the nature of the sunken venation,—reticulated in *Pt. pedata* and *Beecheyana*, forked and free in our plant. The frond is, indeed, generally more compound, and of a somewhat thinner substance.

3. P. *lomariacea;* a foot and more high, root cæspitose, fronds cordate or cordato-ovate coriaceous very opaque, sterile ones extremely variable pinnatifidly 3- or 5-lobed more or less divided into secondary lobes which are oblong or obovato-rotundate, fertile ones similarly divided, the lobes or segments linear-elongated remote with broad and very obtuse sinuses, sori in age broad, stipites elongated (especially of the fertile fronds) black-ebeneous deciduously hairy below, fertile ones much longer than the sterile ones.

a. *septemloba;* sterile fronds about 7-lobed, lobes oblong, subsimple.—Pteris lomariacea, *Kze. in Herb. Monac. et Vindob.* (*fide Klotzsch*). Doryopteris lomariacea, *Kl. in Linnæa*, xx. *p.* 343. Pteris septemloba, *Kl. in Herb. Berol*,

b. *columbina;* sterile fronds broad-cordate sub-5-lobed, lobes closely pinnatifid rotundate or obovate short.—Pellæa columbina, *Hook. MS. in Herb. Nostr.* (Tab. CXII. A.)

c. *digitato-palmata;* larger and very coriaceous, sterile frond broad-palmate 7-lobed, lobes acute, fertile ones deeply digitate with seven flabellate elongated (4 inches long) entire and two lesser deflected lobes.

Hab. a. British Guiana, *Rich. Schomburgk, n.* 1197 (*Klotzsch in Herb. Nostr.*). Old Walls, Infecionado, Diamond district, Brazil, *Gardner, n.* 5297.—b. Summit of the Organ Mountains, Brazil, *Gardner, n.* 5930.—c. Rocky, elevated places in the same locality with a, Diamond district, Brazil, *Gardner, n.* 5298.—In the Pteris-group of Ferns we have, among the *pedate* forms, a set with free venation, here (correctly or not) ranked with *Pellæa* (Allosorus of most authors); and a set with reticulated or anastomosing venation, ranked by some in *Litobrochia*, by others constituting the genus *Doryopteris;* each possesses two species so exactly similar, so completely the analogues of one another, that but for the difference in the *venation*, I do not see how they are to be distinguished: this happily puts an end to all doubt respecting *specific* identity. *Pteris* (or Doryopteris) *Beecheyana*, Nobis, is *Pellæa geraniifolia* with reticulated veins, as our present plant *Pellæa lomariacea* is *Pteris* (or Doryopteris) *pedata* with free veins. Our excellent friend Dr. Klotzsch has assuredly consulted the natural affinity, in uniting, as he has done (in Linnæa, v. xx. p. 342), these two groups of pedate *Pterideæ* into

one genus, but we hardly think that Mr. J. Smith (with whom the venation is a *sine quâ non*) will sanction the adoption of his *Doryopteris* for it. Dr. Klotzsch too overlooks the character (if indeed there be such a character *constant*) of the sori being on the veins or veinlets in *Platyloma*, J. Sm. (corresponding with *Pellæa*), and the continuous marginal receptacle of his *Doryopteris*. I shall have occasion to refer to this subject in considering the genus *Pteris* as adopted in this work.

Pellæa lomariacea I believe to be a very distinct species from the preceding, tolerably constant in the form of the fertile frond, and, like *Pteris pedata*, singularly variable in the sterile frond, which is always smaller, and on a much shorter stipes than the fertile one. In the form I have called (a.), the type of the species, the sterile frond is not peculiarly different from the fertile one; in both the stipes is twice the length of the sterile one, and from 1 to nearly 2 feet long. The second var. (b.) is best understood by the figure of the sterile and fertile frond at Tab. CXII. A. Our var. (c.) is a very remarkable one; the frond is broader than long in both the sterile and fertile frond: the former is quite palmate, cut only about halfway down into seven broad segments, altogether resembling a 7-lobed ivy-leaf; while in the fertile frond the divisions reach almost to the base, the segments are linear, flabellately disposed; at the base are two deflected, lesser lobes. Indeed the three varieties have, at first sight, so distinct an appearance from each other, that did we not know how liable allied species are to sport, they would not be suspected to belong to one and the same species.

4. P. *Tamburii*, Hook.; caudex . . . , frond 6 inches long submembranaceo-coriaceous white and powdery beneath deeply and pedately 5-partite, primary lobes deeply pinnatifid the segments subovate a little falcate usually obtuse undivided or subpinnatifid crenate with a black dot in the sinus of the crenatures, lower or lateral primary lobes ovato-acuminate in circumscription, central primary lobe broad lanceolate, veins sunk obscure (except when held between the eye and the light) forked free terminating in a 2-lobed soriferous apex which is confluent with a marginal line, involucre subintramarginal universal and continuing all round to the points of the lobes slightly sinuate and a little transversely waved, sori subconfluent but all originating on the 2-lobed apex of the vein, stipes longer than the frond and as well as the costa beneath ebeneous purple very glossy. (Tab. CXXIX. A.)

Hab. Tambur River, Eastern Nepal, *Dr. Hooker*.—This is a very peculiar species, truly pedate in the frond, but with a much less hard or rigid and strictly coriaceous texture than the other species of this section. The general form and appearance, and especially the white powdery clothing of the fronds, remind one of some of the farinose species of *Cheilanthes;* but the involucre is continuous, and extends round the apices and along every lobe of the whole frond. The colour of the upper surface, in the dried state at least of the fronds, is of a rich tawny brown colour, as if withered; yet the fructification is not seen to be in a peculiarly advanced state, as if withering from age: the veins are rather wide apart, a little elevated, and consequently visible on the upper surface, quite sunk, and invisible beneath, except when held between the eye and the light, and then they are very conspicuous. There is an evident marginal line at the point of junction of the involucre and the frond, and each veinlet terminates in a thickened, forked, or two-

lobed apex, which lobes are the receptacles of the capsules, and are more or less confluent with the marginal line or nerve, and it is these receptacles which occasion the black dots at the edges of the frond beneath. In age the sori diverge so as to be almost confluent, but they are not continuous on the marginal nerve as in *Pteris*; on the other hand neither are they decurrent on the veinlets; so that it may be considered a dubious point whether this should be considered a *Pellæa* or *Pteris*.

** *Fronds pinnate; pinnæ entire.*

5. P. *paradoxa;* pinnated, pinnæ (9–24 or 25) shortly petiolated (upper ones sessile) large cordato-oblong acute or obtuse glabrous, veins especially beneath obsolete, sori (mature) very broad, involucre very narrow never covering the mature sori, stipes elongated, rachis paleaceo-villous at length glabrous. (Tab. CXI. A.)—Adiantum paradoxum, *Br. Prodr. p.* 155. Allosorus paradoxus, *Kze.* Platyloma Brownii, *J. Sm. in Hook. Gen. Fil. sub tab.* 115 A. (name only, the figure is that of Pellæa falcata); and in *Hook. Journ. of Bot.* iv. *p.* 160. Pellæa cordata, *Fée, Gen. Fil. p.* 130. Pteris cordata, *Sieb. Fl. mixta, n.* 269. Pteris latizona, *All. Cunn. MSS.*

Hab. N. S. Wales, P. Jackson, *Brown, Sieber.* Brisbane River, in dry shady woods, *All. Cunningham, Dr. F. Mueller* (fronds glaucous beneath).—Mr. Brown, probably considering the receptacular veins to extend into the involucre as in *Adiantum* (though to me the real involucre appears to be exterior to these, the portion bearing the sori never being folded in), was induced to refer this fine plant to that genus, and to give it the name of *A. paradoxum;* for it has all the habit of his *Pteris falcata*, which he places in the *Adiantoid* section of *Pteris.* But a careful examination of the sori in the latter plant shows that they have the same origin, and are of precisely the same nature as in his *Adiantum paradoxum.* Mr. J. Smith has consequently, and with much propriety, placed them next each other, in his genus *Platyloma*, with some other pteridoid plants taken mainly from *Allosorus* of Presl. This genus however proves identical with the older one of *Pellæa*, Link, is confirmed by Fée, and is, I think, and as I have already observed, to be preferred to *Allosorus.* Our remarks made under the next species (*P. falcata*), will tend to prove that this plant has a greater affinity with the *P. falcata* than either Mr. Brown or Mr. J. Smith suspected. *P. paradoxa* is a foot to a foot and a half long, the rachis generally a little flexuose, stout. Pinnæ from an inch and a half to three inches long, and from half an inch to full an inch wide. The mature sori form a very broad, continuous band along the spreading portion of the pinnule, and are never, that I can find, covered by the involucre. The *Pellæa cordata* of M. Fée, l. c., founded on the 'Flora Mixta' of Sieber, n. 269, from N. S. Wales (not "from the Cape"), is precisely the *Pellæa paradoxa.*

6. P. *falcata,* Fée; caudex creeping, frond linear-oblong pinnate, pinnæ (26–40 or 50) on very short petioles (the upper ones sessile) oblong-lanceolate generally subfalcate truncate or subcordate at the base acute and often mucronate at the point glabrous or sometimes ferrugineo-hirsute the hairs frequently arising from little bulbs or tubercles, veins

obsolete, involucre narrow when young involute, mature sori forming a broad band just within the narrow involucre, stipes and rachis stout erect clothed with chaffy scales and often spreading hairs.—*Fée, Gen. Fil. p.* 129. Pteris falcata, *Brown, Prodr. p.* 154. *Presl. Hook. Fil. Fl. N. Zeal.* ii. *p.* 24. Allosorus falcatus, *Kze. in Linnæa,* xxxiii. *p.* 219. Platyloma falcatum, *J. Sm. in Hook. Gen. Fil. t.* 15 A. (*under the name of* Platyloma Brownii).

β. setosa; stipes and rachis setose with copious spreading ferruginous hairs, pinnæ subhirsute, the hairs often arising from little bulbs or tubercles.—Pteris seticaulis, *Hook. Ic. Plant. Rar.* iii. *t.* 209. Pt. alternifolia, *Wall. n.* 2182.

γ. nana; small, pinnæ sharply auriculated at the base and strongly mucronate at the point. (Tab. CXI. B.)

Hab. New South Wales and Van Diemen's Land, *Brown, Allan Cunningham.* (Blue Mountains), *R. Gunn, Sieber.* Darbin Creek, *Dr. Mueller.* Raoul Island, Kermada Isles, and Sunday Island, *Macgillivray, n.* 952, and *Milne, n.* 63 (Voy. of H.M.S. Herald, 1854, specimens having the pinnæ quite like those of *P. paradoxa*), Auckland, N. Zealand, Northern Island, *Sinclair, n.* 51.—*β.* India, Dindigul, and Neilgherries, Madras Presidency, *Dr. Wight* and *G. Gardner.* Penang, *Lady Dalhousie.*—*γ.* Dry, leafy woods, Brisbane River, *Allan Cunningham.*—Except the usually taller, but narrower, and more numerously pinnated fronds, with narrower pinnæ, and stipes and rachis squamuloso-hirsute, we see no difference between this and the *P. paradoxa:* and certainly the specimen communicated by Mr. Smith to the 'Genera Filicum,' and there figured (tab. 115 A.) under the name of *Platyloma Brownii* (Pellæa paradoxa), belongs to the present plant, as shown by the form of the pinnæ, clothing of the rachis, etc. If I succeeded in showing a very close affinity between the present and preceding species, it will not be more difficult, thanks to copious specimens, in the herbarium and cultivation, to indicate as great a similarity between the present and the following, *Pellæa rotundifolia.*

7. P. *rotundifolia;* caudex long creeping, fronds pinnate linear rigid decumbent or suberect, pinnæ (30–40) small oval or subrotund rarely oblong-subovate subcordate at the base obtuse or mucronate at the point glabrous, veins obsolete, involucre when young narrow and involute, mature sori forming a broad band never covered with the narrow involucre, stipes and rachis stout clothed with chaffy scales and hairs which are often spreading.—Pteris rotundifolia, *Forst. Prodr. n.* 420. *Sw. Syn. Fil. p.* 102 *and* 297. *Schkuhr, Fil. t.* 99. *Hook. Ic. Plant. t.* 422. *Hook. Fil. Fl. Nov. Zeal.* ii. *p.* 24. Platyloma, *J. Sm.* Allosorus rotundifolius, *Kze. in Linnæa,* xxiii. *p.* 219.

β. oblongifolia; pinnis cordato-oblongis. Pteris oblongifolia, *Colenso, MS. in Herb. Nostr.*

Hab. Northern and middle and southern islands of New Zealand, and in Banks'

Island, *Forster, All. Cunningham, Colenso, D'Urville, J. D. Hooker, Sinclair, etc.* Norfolk Island, *Kunze*.—This handsome species, or, as I fear it ought more correctly to be considered, form of *P. falcata*, is peculiar to New Zealand, unless Kunze is correct in giving it as a native also of Norfolk Island: and the true *P. falcata*, gathered only by Dr. Sinclair in New Zealand, seems very rare; but most botanists find intermediate forms between the two. Indeed our growing plants in the temperate Fern-house at Kew, will show, from the same root, fronds with very varied forms of pinnules, subrotund, oval and oblong. Dr. Hooker's and Mr. Colenso's native specimens exhibit the same variations, so that the former (Fl. N. Zeal. vol. ii. p. 25) has expressed his belief that *P. rotundifolia* will prove to be a form of *P. falcata*.

In this and the two preceding species it is but rare that a true involucre (a narrow, inflexed, membranous edge) is to be seen, or only in the very young state of the fructification, so that the fully formed sori may be said to arise from a quite exposed spreading portion of the pinnæ: if indeed that portion bearing the sori were at any time folded in, as in *Pteris*, it would be an involucre, resembling that of *Adiantum*. I have never seen it in that state.

8. P. *Doniana*; a foot to a foot and a half high, caudex short creeping with copious tufted fibrous roots, frond broad lanceolate pinnated, pinnæ few (10–12–18) 2–3 inches long subcoriaceous on short petioles glabrous oblong-ovate gradually acuminate coarsely serrated in the barren portion, the base obtuse or slightly cordate, veins obscure forked free (not visible except the pinna is held between the eye and the light), sori on all the pinnæ (of the fertile specimen) very narrow even when mature continued from the base nearly to the serrated point, involucre very narrow slightly intramarginal and flattened upon the sorus obscurely transversely wrinkled, stipes and rachis stout strict with a unilateral pubescent line, and as well as the petioles and lower portion of the costa intensely ebeneous black glossy. (Tab. CXXV.) —Platyloma Donianum, *J. Sm. MS.*

β. pinnules narrower more coriaceous and opaque glaucous beneath.

Hab. Tropical Western Africa, Island of St. Thomas, Bight of Biafra, *G. Don.* Acra, *Dr. Vogel.*—β. Abeokuta, *Dr. Irving.*—Mr. J. Smith first directed my attention to a solitary specimen of this Fern in his Herbarium, on which he had remarked, "Habit of *Platyloma paradoxum*, but with very narrow sori." Specimens in my own Herbarium are from Acra, and a slight variety is from Abeokuta, sent to me by the late Dr. Irving, who, had his life been spared, would have contributed largely to our knowledge of tropical African botany. Although so closely allied to our *Pellæa paradoxa*, the narrow lines of fructification bring it near in the structure of the pinnæ (not in composition) to the large varieties of *P. hastata* (see our Tab. CXVI. f. 1); but there the veining is very conspicuous, even to the naked eye; here it is sunk in the substance of the pinna, yet tolerably conspicuous when held between the eye and the light, which is not the case with *P. paradoxa*, nor is it indeed with the var. β. of our present plant; yet I cannot but consider these two as identically one species, and very different from all other known *Pellææ*.

*** *Fronds bi-tripinnate.*

9. P. *gracilis;* caudex 4–6 inches high very slender filiform slightly scaly, fronds thin-membranaceous pale-green bipinnate, sterile pinnules obovate or subrhomboidal sinuato-lobate, fertile ones lanceolate obtuse crenate all more or less petiolate, terminal ones elongated, veins remote simple or forked, sori subrotund, involucres broad continuous very thin membranaceous whitish subconvex but close-pressed, stipes very slender dark-brown glossy, superior rachises winged. (Tab. CXXXIII. B.)—Allosorus gracilis, *Pr., Gray, Man. of the Bot. of North. U. St. p.* 264. *ed.* 2. *p.* 591. *t.* 9 (*excellent*). Pteris gracilis, *Mich. Fl.* ii. *p.* 262 (*not Fée*). Cheilanthes gracilis, *Kaulf. Enum. Fil. p.* 209.

Hab. N. America; Canada (near Malbaye), *Michaux; Goldie in Herb. Nostr.* Shaded calcareous rocks, Vermont to Wisconsin, rare, *Dr. Asa Gray.* Dells of the Wisconsin river, *J. A. Lapham, Esq.* Near New York, *Dr. Knieskern;* Penn-Yan, *Dr. Sartwell in Herb. Nostr.* Northern India; Champwa, Kumaon, elev. 10,000 feet, *Messrs. Strachey and Winterbottom in Herb. Nostr.* Balti, N. W. Tibet, elev. 9000 feet; temperate regions, *Dr. T. Thomson.*—The rarity of this pretty and very delicate Fern, the difficulty of obtaining perfect specimens, and the general resemblance of the fronds to that of some of the states of *Cryptogramme crispa*, together with my detecting specimens identical with them among Dr. Thomson's and Messrs. Strachey and Winterbottom's plants, gathered by them as *Cryptogramme crispa*, induced me for a long time to refer them to a form of that species; nor did the excellent figure recently published of *Allosorus gracilis*, in Dr. Asa Gray's second edition of his 'Manual of the Botany of the Northern United States,' sufficiently convince me of my error. Upon laying my doubts before Dr. Gray, however, he most kindly sent me a beautiful suite of specimens from Mr. Sullivant (gathered by Dr. Sartwell) with the expression of regret that they are destitute of "root-stock, which is never collected, but it has a very small and filiform one,—not the thick rhizome of *Allosorus crispus;* nor do the fronds grow *in tufts*, as in that species, but scattered, so that the various shapes of frond may be found in the same patch (if the sparse assemblage may be so called); they are not clustered in one root." Thus, although the barren and fertile pinnæ differ in form, it is not that marked difference that is found in *Cryptogramme*, as seen in one and the same tuft.

Thanks to these specimens, and others from Mr. Lapham, and to Dr. Gray's remarks, I am satisfied the *P. gracilis* is a very distinct plant, that it is rather a *Pellæa* than a *Cryptogramme*, and happily I find the slender filiform caudex, alluded to by Dr. Gray, among Messrs. Strachey and Winterbottom's specimens. This then is one of the characteristics of *P. gracilis.* The fronds are moreover less compound than in *Cryptogramme;* the pinnules are fewer and more remote upon each pinna; the texture is much more thin and delicate, more pellucid; the involucre more uniformly thin and membranaceous, all of the same texture, and it is more closely appressed to the frond, never rolled back; the sori are shorter, rarely extended beyond the edge of the involucre, never covering the whole back of the pinnule; the stipes is more slender, not stramineous, but deep brown (*badius*) and glossy, scarcely ebeneous.

10. P. *atro-purpurea,* Link; glabrous or with the rachis

more or less ferrugineo-pilose (a span to a foot-and-a-half and more tall), caudex short thick nodose scaly, fronds laxly tufted coriaceous ovato-lanceolate pinnate or below bipinnate, pinnæ subopposite petiolate, pinnules 3–7 (terminal one the longest) oblong or linear-oblong obtuse rarely with a blunt opaque mucro the base truncate or subcordate sometimes hastate or auriculate sterile ones denticulate, veins indistinct, sori broad continuous, involucre formed of the incurved margin of the pinnule the edge only submembranaceous and crenulate, stipes and rachis very black glossy ebeneous.—*Link, Fil. Hort. Berol. p.* 59. *Fée, Gen. Fil.* Pteris atro-purpurea, *Linn. Sp. Pl. p.* 1534. *Mich. Am.* ii. *p.* 261. *Sw. Syn. Fil. p.* 106. *Schkuhr, Fil.* 93. *t.* 101. *Willd. Sp. Pl.* v. *p.* 375. Allosorus atro-purpureus, *Kze. Presl.* Platyloma, *J. Sm.*

β. nana. Pteris gracilis? nana, *Richardson in Frankl. Voy. App. Bot. p.* 39 (*not Mich.*).

Hab. N. America; probably generally through the United States from Texas (*Drummond*), through the Alleghanies to Massachusetts, through Canada to the "woody country of subarctic America, between N. lat. 54° and 64°," when it becomes very dwarf, not an inch high (*Richardson*), and westward to the limestone rocks of the Sashatchawan, *Douglas and Drummond.*—Very variable in size, from the dwarf form just mentioned to 2 feet in height, yet departing but little from the normal character here described. Fertile pinnules from ¾ to 1 inch long; terminal ones often 2 inches and more long; sterile ones ½ an inch broad. Stipes often equal in length to the frond.

11. P. *dura;* a span to a foot high, frond oblong pinnate or below bipinnate, pinnæ opposite, pinnules opposite and alternate glabrous sessile or scarcely petiolated erecto-patent rigid entire linear-elongate or obtuse subcordate or with a sinus at the base, involucres narrow membranaceous continuous quite round the apex, stipes about as long as the frond ebeneous naked, rachis ebeneous rough with short fulvous chaffy curled hairs. (Tab. CXIII. A.)—Allosorus durus, *Presl.* Pteris dura, *Bory in Willd. Sp. Pl.* v. *p.* 376. *Bojer, Hort. Maurit. p.* 400. Pteris angusta, *Bory in Willd. Sp. Pl.* v. *p.* 388.

Hab. Mauritius and Madagascar, *Bojer.*—I received two specimens of this very distinct plant from the late Professor Bojer; the one simply pinnate, marked "*Pteris dura*, Bory;" the other, "*Pteris angusta*, Bojer," with all the lower pinnæ again pinnated, but I think evidently one and the same species. Willdenow compares it with the *Pteris* (Pellæa) *atropurpurea.* It is indeed similar in texture, size, and somewhat in ramification; but the great length of the narrow pinnules will distinguish this form from that and all others of this genus. The frond is 5 inches to a span long; pinnules 1½ to 2 inches long, exactly linear and of the same width throughout; the rather narrow membranous involucre is con-

tinued all round the blunted apex of the pinnule, and a kind of margin to this involucre is formed by the inflection of the edge of the frond; veining indistinct; midrib stout on the under side; stipes and rachis very black and glossy, the latter partially clothed with fulvous, frizzled, chaffy hairs.

12. P. *calomelanos*, Link; glabrous, caudex short thick very scaly, fronds subspithameous cæspitose subcoriaceous oblong-triangular bipinnate, pinnules all petiolulate cordato-(rarely subhastato-) triangular very obtuse entire sometimes subtrilobate or sinuate at the margin, the sinus deep and narrow, veins dichotomously radiated, sori continuous, involucres membranaceous, stipites short scaly at the base and as well as the slender rachises and petioles black-ebeneous very glossy.—*Link, Fil. Hort. Berol. p.* 61. *Fée, Gen. Fil. p.* 129. Allosorus calomelanos, *Presl, Tent. Pterid. p.* 153. *Hook. Bot. Mag. t.* 4700. Pteris calomelanos, *Sw. Syn. Fil. p.* 106. *Willd. Sp. Plant.* v. *p.* 393. *Kze. in Linn. p.* 525. *Schlecht. Adumbr. Fil. Cap.* 43. *t.* 24. Platyloma, *J. Sm.* Pteris hastata, *Thunb.* (*not of others*):

Hab. Mountain districts, South Africa, growing in rocky places at elevations above the sea varying from 400 to 4000 feet, according to *Drége;* about the Cape, Table Mountain, etc., *Dr. Pappe; Capt. Carmichael.* Graham's Town, *Mr. Atherstone.* Macalisberg, *Zeyher and Burke, and Mr. Anderson.* Isle of Bourbon, *Capt. Carmichael in Herb. Nostr.* North-western India; Simla, *Major Madden;* Kumaon, below Almora, elev. 4000 feet, *Strachey and Winterbottom;* Tikri in Karli, Himalaya, 5–6000 feet elev., *Mr. Edgeworth.*—An elegant and graceful Fern, apparently a dry-country species, and by no means confined, as had been long supposed, to the mountain regions of the Cape of Good Hope. We are enabled to give the above localities from fine specimens in our Herbarium. It is strange that Kunze (in Linnæa, vol. x. p. 525) should say of this plant, "Neque ad *Allosorum*, neque ad *Cheilanthem* pertinet, et veros *Pteridis* characteres offert." There can be little doubt of its belonging to the same group or genus of *Pterideæ* as *Allosorus cordatus* and its allies.

13. P. *auriculata*, Link; glabrous, a span high, caudex short stout scaly, fronds oblong-lanceolate cæspitose submembranaceous olivaceous rather pellucid pinnate very rarely below sub-bipinnate, pinnules shortly petiolate triangular-ovate or hastately 3-lobed or at the base pinnatifid lobes obtusely crenulate at the margin, sori continuous or here and there interrupted, involucres moderately broad membranaceous convex or fornicate sinuato-crenate, stipes short, and rachis dark-purple ebeneous.—*Link. Fée, Gen. Fil. p.* 129. Pteris auriculata, *Sw. Syn. Fil. p.* 103. *Willd. Sp. Pl.* v. *p.* 365. *Sieb. Syn. Fil. n.* 8. *Schlecht. Fil. Cap. Adumb. t.* 22. *Hook. et Grev. Ic. Fil. t.* 116. Pteris confluens, *Thunb.* Adiantum, *Thunb. Cap. ed. Schultes,* ii. *p.* 733. Cheilanthes au-

riculata, *Link. Kze. in Linnæa*, xxiii. *p.* 242. Cassebeera, *J. Sm.* Allosorus, *Presl.*

Hab. South Africa, rocky mountains about Cape Town, Clanwilliam district, etc. —A very distinct species, less harsh and rigid than the *Pellææ* in general, with a good deal of the habit of *Cheilanthes Capensis*. The forked venation is very distinctly seen when held up between the eye and the light. Mr. Brown correctly notices (Prodr. Fl. Nov. Holl. p. 154) that the "involucrum fornicatum margine interiore inflexo soros includit, itaque et ob habitum separari (a *Pteride*) debet." This involucre is very well represented in Dr. Greville's excellent figure (Ic. Fil. Rar. t. 116. f. 1). Our largest specimens are a foot long; young ones have the fronds very flaccid and subpellucid; older ones with mature fructification more rigid and opaque.

14. P. *Seemannii*, Hook.; much tufted 4–6 inches high, caudex short thick (not creeping) densely fibrous, fronds ovato-lanceolate membranaceous opaque obsoletely pubescent pale and subglaucous beneath bipinnate, pinnules sessile ovate or subcordate obtuse upper ones confluent inferior ones of the pinnæ free sinuato-pinnatifid with few and very obtuse lobes, veins sunk obsolete (except seen between the eye and the light) several times forked approximate, veinlets parallel, sori narrow, involucres entire, stipes short (1–3 inches) slender pale brown a little scaly at the base, rachises herbaceous. (Tab. CXVII. B.)

Hab. Mazatlan, Mexico, *Seemann. n.* 1447.—A very distinct species from any known to me, with very much the habit and mode of growth, dense fibrous roots, and thin submembranaceous tufted fronds of the Cape *P. auriculata*; but the fronds are broader, more compound; the pinnules larger, more confluent, the stipes and rachis more herbaceous, the veins closer, more parallel, more frequently forked; the fronds are opaque, and the veins only to be seen when the specimen is held between the eye and the light.

15. P. *Skinneri*, Hook.; a span and more high, caudex . . . , fronds deltoideo-ovate acuminate bipinnate submembranaceous glabrous or very sparsely and minutely hairy beneath veined, primary pinnæ few distant petiolate, secondary ones or pinnules sessile rhombeo-acuminate, upper ones coadunate and entire, those of the lower pinnæ sessile decurrent lobed or pinnatifid segments acute or acuminate, veins obliquely parallel several times forked, sori continuous, involucres narrow submembranaceous close-pressed, stipes scaly only at the base, and the rachises stramineous glossy. (Tab. CXVIII. B.)

Hab. Guatemala, *G. U. Skinner, Esq.*—Four specimens of this Fern, sent to me by Mr. Skinner, are all that is known to me of this very distinct Fern, and I cannot refer it to any described species, nor point out any one to which it is closely

allied. The fronds in the dry state are quite tawny; the stipes and rachises pale stramineous.

16. P. *ternifolia*, Fée; glabrous, spithameous to a foot high, caudex short bulbiform scaly, fronds coriaceous dark-green narrow oblong lanceolate pinnate, pinnæ opposite trifoliate (pseudo-verticillate) sessile, pinnules (reflexed when dry) linear mucronate uniform (mucro short opaque) two lateral ones sessile intermediate or terminal one subpetiolulate, veins immersed obscure, sori continuous all round the point, involucres broad plane formed of the rigid margin of the pinnule the edge only submembranaceous, stipes and rachis black-ebeneous very glossy.—*Fée, Gen. Fil. p.* 129. Allosorus ternifolius, *Kze. in Linnæa,* xxiii. *p.* 220. Pteris ternifolia, *Cav. Presl,* 1801, *n.* 657. *Hook. et Grev. Ic. Fil. t.* 126. Pteris verticillata, *Sw. Syn. Fil. p.* 103. *Willd. Sp. Pl.* v. *p.* 375. *Presl, Relig. Hænk.* i. *p.* 57. Platyloma ternifolium, *Brackenr. U. S. Expl. Exp. Fil. p.* 94. Pteris Peruviana, *Poir.* (*Kze.*)

Hab. Andes of Peru, *Jos. Jussieu* (*Cav.*). Purrucuchu, *Mathews.* Baños, *Brackenridge.* Huanuco, *Pœppig.* Quito, on old walls and buildings, *Jameson.* Caracas, *Linden, n.* 513. Sierra Nevada, N. Granada, *Schlim, n.* 848. Sierra de Achira and El Moro, Andes of Chili, *Gillies.* Mexico, *Schaffner.* Sandwich Islands, *Menzies, Douglas.* On Mouna Loa and Mouna Kea, elev. 9000 feet, in great luxuriance, *Brackenridge.*—One of the most distinct of all Ferns. We do not see why the excellent Swartz should have changed the name *ternifolia* of Cavanilles (1801) to *subverticillata*, in his 'Synopsis Filicum' (1806), quoting too, as he does, Cavanilles' name and date of publication.

17. P. *Wrightiana*, Hook.; glabrous tufted (spithameous), caudex short thick nodose scaly, fronds coriaceous pale glaucous green broad lanceolate bipinnate, pinnæ opposite sessile trifoliolate lowest pair pinnate, pinnules of all the pinnæ linear-oblong (sterile ones broad oval) with a rather cartilaginous mucro, lateral ones sessile, terminal one more or less petiolulate, sori continuous, involucres much recurved very rigid formed of the coriaceous convolute margin of the pinnules a little thinner at the edge, stipes and rachis black-ebeneous very glossy. (Tab. CXV. B.) Allosorus mucronatus, *D. C. Eat. MS.* (*not of Sillim. Journ. July,* 1856?).

Hab. New Mexico, *C. Wright, Coll. N. Mex.* 1851–52, *n.* 2130. Valley of Rio Grande, *Major Eaton, U.S.A.*—This and the following species (*P. longimucronata* and *P. ornithopus*) are very interesting species, for such I am disposed to consider them, evidently forming, along with *Pellæa ternifolia*, a small but natural group. They are nearly the same in size; all have the tufted stipites springing from clustered bulb-like scaly caudices or rhizomes, about the size of hazel-nuts; all have a singularly rigid habit, and narrow (at least when fertile), somewhat linear pinnules; these pinnules are distinctly mucronate at the point. *Pellæa*

ternifolia, as far as I have yet seen, has the pinnæ invariably trifollolate; stance, in all my numerous specimens, of an approach to the pinnæ becoming pinnate; the colour too is a dark olive-brown (when dry), never in the least glaucous; and in all the entire frond is fertile, the mucro short opaque. Our plant now under consideration, in three very perfect specimens, has the fronds of a pale glaucous green, the superior pinnæ are trifoliolate, the lowermost pair are pinnate, and these latter are moreover generally sterile, and of a broad, oval form, plane; all too are terminated by a cartilaginous, distinct, pellucid mucro. How far difference of climate may affect these plants it may be hard to say, and whether the more compound nature of the frond, and the more decided mucro, and the very different colour, etc., may be due to the more northern latitude, I will not undertake to determine.

18. P. *longimucronata*, Hook.; glabrous (a span to a foot high) tufted, caudex short thick nodose scaly, fronds coriaceous glauco-pruinose ovato-lanceolate bipinnate, pinnæ nearly opposite sessile, pinnules 7–9–13 opposite (in rather distant pairs) linear-oblong a little broader at the base sessile acute rather long cartilagineo-mucronate at the point terminal ones petiolulate, sori continuous, involucres broad formed of the coriaceous hard inflexed margin of the pinnule, stipes and sometimes pruinose rachis black-ebeneous very glossy. (Tab. CXV. A.) *β. minor.* Allosorus mucronatus, *D. C. Eaton, MS.* (*and in Sillim. Journ. July*, 1856).

Hab. New Mexico, *C. Wright, Coll. N. Mex.* 1851–52, *n.* 2131. *β.* Bernicia, California, *Major Eaton, U.S.A.*—My specimens of *P. longimucronata* and the last species of *Pellæa* are from the beautiful collection of the Plants of New Mexico, made by Mr. C. Wright, who accompanied the U. S. Boundary Commission, under the command of Colonel Graham. They have several points in common with each other and with *P. ornithopus* and *P. ternifolia*, as observed under our last described species. This, however, is much further removed from the latter species than is *Pellæa Wrightiana*, which indeed may be considered an intermediate form. The present is broader in its outline or circumscription, than that species, and it is throughout bipinnate, and with smaller pinnules, though the fronds are often longer; a trifoliolate pinna is rarely to be found on any of my specimens. The general aspect of this little group is not unlike that of the fronds of *Pellæa andromedæfolia*, but the pinnules are longer and narrower in proportion, and acute and strongly mucronate.*

19. P. *ornithopus*, Hook.; glabrous (a span to a foot high), caudex short thick nodose scaly, fronds tufted coriaceous strict rigid ovate or ovato-lanceolate bipinnate, pinnæ and secondary pinnæ opposite distant the latter 3-foliolate,

* Since most of the above was in type I have received, through the kindness of Daniel C. Eaton, Esq., New Haven, Connecticut, specimens of my *P. Wrightiana* (from the Valley of the Rio Grande), and of *longimucronata*, *β* (from California), both as "*Allosorus mucronatus*" of that author, above quoted. The very brief character given in 'Silliman's Journal' does not enable me to determine which of the two is the true *mucronatus*, otherwise that name has the right of priority.

pinnules short subcylindrical-terete sessile (rarely subpetiolulate) mucronate reflexed (when dry) ultimate ones solitary, sori continuous, involucres formed of the revolute margins of the pinnules scarcely thinner at the edge, stipes and rachises dark purple somewhat glaucous scarcely glossy. (Tab. CXVI. A.)

Hab. California, *Hartweg, n.* 2042. "Between the Mississippi and the Pacific Ocean, near the 35th parallel of lat., in 1853 and 4:" the specimens marked by Dr. Asa Gray "*Pteris andromedæfolia*, Kaulf., var., Cohon Pass" (most likely gathered within the limits of California), *Dr. J. M. Bigelow.* Dry hills about Monterey, *W. Lobb.*—That this plant belongs to the same group with *P. Wrightiana* and *P. mucronata* and *P. ternifolia* no one can doubt who has the opportunity of comparing them, for they all have characters in common: but the present differs from the rest specifically, if I may judge from the several specimens in my possession, and from three different collectors. The fronds are from a span to a foot high, bipinnate: the secondary pinnæ all trifoliolate, except the ultimate ones, which are simple and solitary, all opposite, and the pinnule so formed and so arranged in the trifoliolate pinnæ as to resemble the claws of the foot of a small bird, each terminated with a distinct mucro. I have never received any specimens but from California. The terete appearance of the pinnules is caused by the strongly revolute margins, completely enclosing the fructifications, with a deep line or furrow, formed by their approximated margins, at the back of the frond.

20. P. *rigida;* caudex scarcely any, roots tufted very wiry, fronds ovate or deltoid-ovate bi-tripinnate, pinnæ opposite, pinnules sessile subopposite or alternate deltoid-lanceolate rather obtuse, the margins crenate and ciliate, decurrent at the base, inferior ones often with an acute lobe on the upper base, sori continuous formed of the revolute margin subcrenate, stipes and rachis purple-ebeneous glossy very paleaceous, scales spreading.—Allosorus rigidus, *Presl, Kze. Syn. Fil. Pœp. in Linnæa,* ix. *p.* 55, *and in Linnæa,* xiii. *p.* 137. *Liebm. Fil. Mex. p.* 70. Pteris rigida, *Sw. Syn. Fil. pp.* 104 *and* 299. *Willd. Sp. Pl.* v. *p.* 384. Pteris cartilaginea, *Presl, Reliq. Hænk. p.* 67, *t.* 9, *f.* 3. Pteris acutangula, *Nees in Linnæa,* xix. *p.* 684.

Hab. Peru; Chalma (an prope Chalcua?, *Kze.*), *L. Née.* Sterile rocks, near San Rafael and Ambu, *Pœppig.* Mexico (*Presl*), *Liebmann, Aschenborn, C. Ehrenberg, Liebold in Herb. J. Smith.*—Presl seemed to suspect that his *Pt. cartilaginea* might prove a glabrous fronded variety of the *Pt. rigida* of Swartz, and Kunze confirmed this suspicion. The only specimens that have come under my notice are in Mr. J. Smith's Herbarium, from Mexico, and of these Presl's is a very faithful representation, as to general outline; and, as may be seen by his figure, the general form and composition are not very unlike exceedingly small specimens of *Pteris* (Allosorus, *Pr.*) *aquilina;* not so near however as to justify the opinion of Link, of whom Kunze says, "Qua ratione ductus cl. Link (Hort. Berol. ii. p. 33), *P. cartilagineam,* Presl, *aquilinæ* varietatem autumare possit, non intelligo."

Mr. Smith's specimens are very perfect. The largest specimen is a foot high,

erect, rigid; frond 5 inches long, subdeltoideo-ovate, coriaceous, dark brown in the dry state, slightly hairy; frond tripinnate (in the smaller specimens bipinnate, with most of the pinnules decurrent and confluent); the lower pinnules of the primary and secondary pinnæ with an acute lobe or auricle on the upper side of the base, and sometimes on the lower (showing a disposition to become pinnatifid), and then the pinnule is hastate. The lowest pinna of the lowest pair of primary pinnæ being longer than the rest, and a little deflexed, give a somewhat pedate form to the outline of the frond. The species is remarkably distinct, and correctly figured by Presl.

21. P. *consobrina*, Hook.; a span to a foot and a half high, caudex short thick paleaceous, frond triangular coriaceous 3-pinnate glabrous, pinnules sessile (not decurrent) oblong obtuse obscurely crenulate or ovate and deeply pinnatifid veined, segments oblong obtuse terminal one elongated, involucres subintramarginal membranaceous crenato-lobate at the edge, stipes long and very stout paleaceous only at the very base and as well as the rachis black-purple glossy. (Tab. CXVII. A.)—P. consobrina, *Kze. in Linnæa*, x. *p.* 526. Pteris obscura, *Boj. MS. in Herb. Hook.*

Hab. South Africa, among *Mimosæ*, Key River, woods in Uitenhage, *Ecklon.* Clefts of rocks in the Witbergen Mountains, *Drége.* Graham's Town, *Atherstone.* Port Natal, *Dr. Stanger.* Madagascar, *Bojer.*—An authentic specimen from the author satisfies me that I am correct in referring the above specimens in my Herbarium, from Graham's Town, Natal, and Madagascar, to the *Pteris consobrina* of Kunze. They all agree in the very stout, elongated stipes, triangular, decompound frond: the pinnules however vary much in size in the different samples. In the perfect state of the fructification the sorus is clearly intramarginal, but when more advanced the patent involucre conceals that character. It may be considered allied to *P. hastata*, which has however a different form of frond, and is much less compound. Kunze compares it with *Pteris* (Cheilanthes, *Hook.*) *Capensis* (Tab. Nostr. LXXVII. A.), but, I think, with little reason.

**** *Mostly tripinnate or decompound.*

22. P. *hastata*, Link; generally quite glabrous from a few inches to two feet or more, caudex nodose scaly, root fibrous, fronds oblong subcoriaceous opaque pinnate more frequently bi-tripinnate, pinnules oval or lanceolate obtuse or acuminated cordate or subcuneate at the base auriculate on one side or hastate sessile (rarely subpetiolulate) crenulate at the margin, terminal ones of the primary pinnæ often the largest, veins dichotomous free distinct on the under side, sori continuous, involucres rather narrow (in part formed of the substance of the leaf) membranaceous crenated and sinuated, stipes more or less long scaly at the very base, and rachises which are erect stiff, rarely a little sinuous, dark-purple ebeneous glossy. (Tab. CXVI. B.)—*Link, Fil. in Hort. Berol. p.* 60. *Fée, Gen. Fil. p.* 129. Allosorus hastatus, *Pr. Tent.*

Pterid. p. 153. Pteris hastata, *Sw. Syn. Fil. p.* 105. *Willd. Sp. Pl.* v. *p.* 391. Cassebeera, *J. Sm.* Adiantum, *Linn. Suppl. p.* 447. Pteris viridis, *Försk.* Pteris auriculata, *Thunb. Prodr. p.* 172. Cheilanthes hastata, *Kze. in Linnæa,* x. *p.* 532, *and* xxiii. *p.* 243. Pteris adiantoides, *Willd.* (*fide Schlecht.*) Pteris polymorpha, *Poir.*—Var. *macrophylla;* much larger in every part. (Tab. Nostr. CXVI. B. *f.* 4.) Cheilanthes hastata, *var.* macrophylla, *Kze. in Linnæa,* x. *p.* 532. Cheilanthes macrophylla, *Kze. l. c.* xxiii. *p.* 244.—Var. *stenophylla;* bipinnate, pinnæ and pinnules linear-lanceolate acuminate undivided or hastate lobes elongated, partial rachises pubescent. *Kze. in Linnæa,* x. *p.* 533 (under *Cheilanthes*). Pteris hastæfolia, *Schrad.* Pteris spiculata, *Schkuhr, Fil. t.* 100.

Hab. S. Africa, frequent, from the neighbourhood of Cape Town to Graham's Town, Natal, and Algoa Bay, *numerous botanists and travellers.* Island of Nissobé, Mozambique Channel, Madagascar, *Dr. Lyall, Bojer.* Mauritius, *Telfair, Carmichael, Sieber, Syn. Fil. n.* 80, *Wallich.* Bourbon (*Herb. Mus. Paris.*).

If we do not accord with Professor Kunze in referring this plant to *Cheilanthes,* we nevertheless heartily assent to his remark in the 'Linnæa,' vol. x. p. 533, "Filix, si quæ ulla, magnitudine frondis, divisionumque ambitu, necnon indumento, imprimis rachium partialium et stipitis, maxime variabilis," and in his uniting the *P. hastæfolia* of Schrader with it as a mere variety "*stenophylla;*" and we cannot but regret that in a subsequent Memoir (Linnæa, vol. xxiii. p. 243), he has separated these plants as three distinct species, viz., 1, *Ch. macrophylla,* 2, *Ch. hastæfolia,* and 3, *Ch. hastata.* Our numerous specimens show to us clearly that they are but one; and Kunze himself says of his *β. canonica,* the normal form, that it is intermediate between his *α. macrophylla* and his *γ. stenophylla.* Of this latter we find so good a representation of a portion of frond in Schkuhr's 'Fil.,' t. 100, under the name of *Pteris spiculata,* that we quote it without hesitation, and in all probability there is some error in regard to the country of that plant. It is given as "In Americ. Bor. Florida? s. in montibus Alleghanis saxosis, Mich." Hence some have considered it to belong to *Pellæa atro-purpurea,* the only N. American species which approaches it. We give here a figure of the pinnæ of the normal form of this plant, and of the *macrophylla* of Kunze.

23. P. *Bojeri,* Hook.; erect straight, caudex . . . , frond glabrous broad-lanceolate bi-tripinnate, primary pinnæ ovato-lanceolate petiolate, pinnules firm subcoriaceous sessile and subdecurrent linear-oblong entire or ovate and pinnatifid segments oblong terminal one elongated all obtuse entire, involucres scarcely membranaceous at the edge, stipes (as long as the frond) hirsute with spreading chaffy hairs and as well as the rachises black-ebeneous very glossy. (Tab. CXIX. A.)—Pteris lasiopteris, *Bojer MS. in Hook. Herb.*

Hab. Madagascar, in shady and dry places.—There is a peculiarly strict and neat habit about this plant, of which I have seen only one specimen. It may rank near *P. hastata,* and still nearer *P. consobrina;* but it seems distinct from

these and from all others with which I am acquainted. The caudex is unknown to me; the stipes nearly a span long, and the frond about the same length. The entirely sessile and even subdecurrent pinnules are a striking character in this plant.

24. P. *Boivini*, Hook.; cæspitose, a span to a foot high, caudex nodose with copious woolly fibres, fronds subtriangular-ovate bi-tripinnate glabrous, pinnules elliptical or ovate sessile coriaceous spreading horizontally very obtuse on very short petiolules subcordate at the base all entire opaque, veins forked free internal obsolete, involucres subintramarginal rather narrow membranaceous obscurely crenate at the edge, stipes subflexuose stout, and as well as the wiry rachises black-ebeneous glossy. (Tab. CXVIII. A.)

Hab. South-eastern Africa, Macalisberg, *Zeyher and Burke.* Island of Nissobé, east coast of Africa, *M. Boivin.* Mauritius, *Bojer.*

To this plant there seems to be no evident caudex; several stipites rise from a very tufted fibrous root, are at first more or less curved or flexuose, then erect and remarkably strict where they form the main rachis. The secondary rachises, which are sometimes a little hairy, stand out horizontally, and the pinnules at right angles from these, and appear to be soon deciduous, falling off from the rachises, leaving their short petiolules, the denuded fronds then very much resembling some black marine coral. This species again has a certain affinity with *P. hastata*, but the pinnules are very different in shape, and never again divided or pinnatifid; still more affinity with the North American *P. atro-purpurea*, but that also has differently formed pinnules. Nor is it far removed in general habit from the Mauritian *Pteris* (Litobrochia, *Presl*, Doryopteris, *J. Sm. and Fée*) *articulata*, Kaulf.; but in that the pinnules are much larger, and in the fertile ones gradually and much acuminated, and in the copiously anastomosing venation (though difficult to be seen) there is ample means of distinction. I may however observe that in our *P. Boivini* I have seen some of the veins, though rarely, anastomosing. It is not the normal state of the venation.

25. P. *robusta*, Hook.; "fronds uniform? (not of two kinds), fertile one coriaceous glabrous oblong obtuse tripinnate or bipinnato-pinnatifid, pinnules or laciniæ ovate or elliptical cuneate at the base, general rachis and stipes short semiterete stout curved flexuose purple, caudex stout creeping densely ferrugineo-paleaceous," *Kze.* — Allosorus robustus, *Kze. in Linnæa*, x. *p.* 502, *and in Schkuhr, Fil. Suppl.* ii. *p.* 7. *t.* 104.

Hab. South Africa; stony mountains in Namaqua Land, *Drége.*—My own specimens of this, I think, very distinct plant, are derived from the same source as those described by Kunze, the author of the species; and as the entire stipes and caudex are wanting to me, I give his character, which, together with his figure above quoted, appear to be very faithful. He seems however to have a groundless fear lest it might prove to be identical with *Cryptogramme* (Allosorus) *crispa*. "Hæsitavi paullisper," he says, "num speciem *A. crispo* similem separarem, nec ne fide comparatione speciminum *A. crispi* e diversissimis regionibus persuasum mihi est, utramque esse diversam." "In our present plant," Kunze goes on to

say, "I have only seen fertile fronds from the caudex:—this *caudex* is nearly as thick as the little finger, creeping, densely ferrugineo-paleaceous, bearing a few short roots. *Stipes* scarcely an inch long, above slightly grooved, flexuose, very stout, black-purple. *Frond* three inches long, oblong in circumscription, pinnules and segments crowded; rachis like the stipes, stout, curved, and flexuose, purple." The very crowded fertile pinnules, their broader and shorter form, but above all the texture, and the texture of the involucre formed of the incurved coriaceous pinnule, scarcely membranaceous, even at the edge, and its very sinuated and crenated margin will readily distinguish this *Pellæa* from any state of *Cryptogramme crispa.*

26. P. *cordata*, J. Sm.; caudex short creeping stout densely clothed with ferruginous subulate scales, frond erect ovate-oblong bi- rarely below tripinnate, pinnules on short petioles cordato-ovate obtuse firm subcoriaceous distinctly veined glanduloso-pubescent, stipes pale-coloured (substramineous) stout sparsely and deciduously scaly and erect and as well as the rachises straight.—*J. Sm. Cat. Kew Ferns, p.* 4 (*not* Pellæa cordata, *Fée, Gen. Fil. p.* 128). Allosorus cordatus, *Presl, Tent. Pterid. p.* 153. *Kunze in Linnæa*, xiii. *p.* 135. *Hook. Bot. Mag. t.* 4698. Platyloma cordatum, *J. Sm. in Bot. Mag. Comp.* lxxii. *p.* 21. Pteris cordata, *Cav. Præl.* 1801, *n.* 662. *Sw. Syn. Fil. p.* 106. *Willd. Sp. Pl.* v. *p.* 392. *H.B.K. Nov. Gen. Am.* i. *p.* 15 (*not Pteris* cordata, *Sieb. Fl. Mixt. n.* 269.) Pellæa sagittata, *Link, Fée.* Allosorus sagittatus, *Presl, Kze. Fil. p.* 48. *t.* 24. Pteris sagittata, *Cav. Præl.* 1801, *n.* 661. *Sw. Syn. Fil. p.* 106. *Willd. Sp. Pl.* v. *p.* 392. *H.B.K. Nov. Gen. Am.* i. *p.* 14.

Hab. Mexico (*Andrieux, n.* 41, *Dr. Coulter, n.* 1688, *Schaffner, n.* 5), and Columbia, *Linden, n.* 504, *and Suppl.* 304.—We are not the first (in Bot. Mag. under t. 4698,) to express doubts as to the *P. sagittata* being really distinct from the *P. cordata*, and an examination of numerous specimens has led to the conclusion that there is no real distinction between them. The younger the pinnules the more sagittate or almost hastate the form; and even in the adult pinnules we find them vary from rotundato-cordiform to oblong-sagittate (with blunt lobes). These pinnules are of a firm and coriaceous texture, the presence of glandular hairs is not constant, and the long, conspicuous, but scattered and patent, subulate scales of the caudex are very peculiar. This latter is stout and firm, sometimes a foot long, and, as well as all the rachises, of a rather bright reddish straw-colour, sometimes approaching to peach-colour.

The *Pteris cordata* of Sieber's 'Flora Mixta,' n. 269, and *Pellæa cordata* of Fée, Gen. Fil. p. 130, which the latter author considered a Cape Fern is an Australian plant, and the *Pellæa paradoxa*, p. 135, of this volume.

27. P. *flexuosa*, Link; caudex long creeping moderately stout clothed with numerous subulate scales, frond (sometimes) ample 2 and more feet long oblong in outline scandent divaricately bi-tripinnate, primary pinnæ often deflexed, pinnules on short petioles generally remote cordato-ovate

obtuse varying extremely in size on different specimens glabrous obscurely veined firm subcoriaceous, rachises singularly flexuose (zigzag), caudex stout firm straight or nearly so with scattered deciduous scales and as well as the rachises reddish or brownish straw-colour.—*Link, Fil. Sp. p.* 60. *Fée, Gen. Fil. p.* 129. *J. Sm. Cat. Kew Ferns, p.* 3. Allosorus flexuosus, *Kaulf. Ind. Fil. MS. fide Kunze in Linnæa,* xiii. *p.* 136. *Kunze, in Schk. Fil. Suppl. p.* 46. *t.* 23. *Hook. Bot. Mag. t.* 4762. Platyloma flexuosum, *J. Sm. En. Fil. in Bot. Mag.* 72, *Comp. p.* 21. Pteris flexuosa, *Kaulf. MS. in Linnæa,* v. *p.* 614 (*excl. the synonyms*). *Hook. Ic. Plant.* ii. *t.* 119.

Hab. Peru; Chacapoyas, *M'Lean, Mathews.* Quito, *Dr. Jameson, n.* 11. Columbia, Merida, *Moritz, n.* 67. Venezuela, Tovar, *Fendler, n.* 89. Mexico, *Liebmann.* Talca, etc., *Jurgensen, n.* 688; Tacubaga, *Schaffner, n.* 3 (fronds 2 feet long, pinnules very small, scarcely 3 lines long); Oaxaca, *Galeotti, n.* 6558. N. W. Mexico, *Seemann, n.* 1940 (pinnules an inch long). Between Western Texas and El Paso, New Mexico, *Chas. Wright, n.* 825.—In the majority of specimens of this handsome Fern, it is easy enough to separate them from the preceding, *P. cordata;* and in a state of cultivation, as they appear in the temperate Fern-house at Kew, they maintain their respective characters; but we do receive from our botanical travellers, mixed with the true *P. flexuosa,* specimens which, if they had been sent apart, we should be disposed to refer to *P. cordata,* accompanied by others which, being partially zigzag only at the summit of the frond, seem to indicate a passage from the one to the other. We have faithfully figured the two in the 'Botanical Magazine,' and every one must form his own judgment of the value of the characters. Among the Ferns such difficulties meet us at every step. The stipes and rachises are more or less downy or glabrous. As we have observed in the Bot. Mag. l. c., the very pale almost straw-colour of the stipes and rachises are at variance with a part of Professor Link's generic character of *Pellæa:* "stipitibus fusco-badiis, nigrescentibus, lucidis."

28. P. *andromedæfolia,* Fée; caudex short thick densely clothed with long silky subulate flexuose chaffy scales, frond ovate (6 inches to a foot long) bi-tripinnate, pinnules sessile thick fleshy (almost black when dry) elliptical veined glabrous rarely pubescent the margins revolute, stipes chaffy at the base erect stiff glabrous and as well as the straight or slightly flexuose rachises purplish straw-colour often with a deciduous whitish bloom.—*Fée, Gen. Fil. p.* 129. Allosorus andromedæfolius, *Kaulf. in Kunze, Analect. Pteridogr. p.* 18. *t.* 11. *Syn. Fil. Pœp. in Linnæa,* ix. *p.* 56. *Revis. Acotyl. Cap. in Linnæa,* x. *p.* 503. Pteris andromedæfolia, *Kaulf. Enum. Fil. p.* 188. Crypteris divaricata, *and* C. pubescens, *Nutt. MSS. in Herb. Hook.*

Hab. California, *Dr. Coulter, n.* 823; San Francisco, *Chamisso, Dr. Sinclair.* Monterey, *Nuttall, W. Lobb.* Chilian Andes, *Macrae, Cuming, n.* 184, *Bridges, n.* 557. Kendo, S. Africa, *Drége, in Herb. Nostr.*—Kunze has well observed of this, "Species affinis *Allosoro cordato* et *A. flexuoso.* Uterque vero differt foliolis

cordatis, hic imprimis rachi scandente." It evidently belongs to the same natural group as they, but is smaller in all its parts; the pinnules are sessile (except sometimes the terminal ones), almost invariably elliptical in form, not cordate at the base, turning of a very dark colour, almost black, when dry. The stipes and rachises partake more of a purplish hue, and they have often a whitish bloom upon them. I have never seen specimens corresponding with this species from Mexico, Columbia, and Peru: it seems confined to the drier countries of California, Chili, and the Cape of Good Hope! in the latter country, I apprehend, being very rare. Kunze's figure in the Analecta Pteridogr. is a good representation of the species.

29. P. *pulchella*, Fée; roots cæspitose, caudex none, plants densely tufted small scarcely a span high, fronds 3–4 inches long ovate-oblong bi-tripinnate, pinnules small glabrous subcoriaceous cordato- or ovato-elliptical petiolulate glabrous very obtuse the margins reflexed, the petiolules sometimes rather long very slender, stipites scaly only at the very base and rachises everywhere ebeneous-black glabrous and glossy. —*Fée, Gen. Fil. p.* 129. Allosorus pulchellus, *Mart. et Gal. Syn. Fil. Mex. p.* 47. *t.* 10. *f.* 1. Allosorus formosus, *Liebm. Fil. Mex. p.* 68.

Hab. High mountain regions of Mexico, elev. 7–8000 feet, growing in tufts from the fissures of rocks south of Sola, *Martens and Galeotti.* Oaxaca, *Liebmann.* Rocks near Ciudad Real, Chiapas, *Linden, n.* 1546. In Monte San Felipe, *Andrieux, n.* 42. Between Western Texas and El Paso, New Mexico, *Mr. Chas. Wright, n.* 824. Lofty Andes of Peru, *Mr. M'Lean.*—This again, in the nature and character of its pinnules, has considerable affinity with our last species, but in them only. They are smaller and more cordate at the base, and are borne on rather long petiolules. In some pinnules the sori are so exposed as to represent a *Nothochlæna*, in others the margin forms a very distinct involucre. The tufted fronds, glossy ebeneous stipites and rachises, are very peculiar. I possess no authentic specimens of this from the authors, but I cannot doubt that the specimens here adduced are identical with the *Allosorus pulchellus* of Martens and Galeotti. Liebmann changed the name of *Allosorus pulchellus* to *Allosorus formosus*, because there was an *Allosorus pulchellus* of Bory, but that is now referred to *Cheilanthes.*

30. P. *densa*, Hook.; small, tufted, caudex short thick scarcely creeping, fronds deltoid rather firm glabrous palish green tripinnate, pinnules sessile or shortly petiolulate linear-oblong acute or even mucronate tapering at the base the margins a little waved, sori copious broad continuous almost to the apex, involucres intramarginal nearly meeting at the costa close-pressed membranaceous subcrenate at the edge, stipites glabrous glossy pale chestnut-colour, rachises and petioles herbaceous compressed. (Tab. CXXV. B.)—Onychium densum, *Brackenridge, Fil. of U. S. Explor. Exp. p.* 120. *t.* 13. *f.* 2.

Hab. N. W. America. Grass Valley, California, *Dr. J. M. Bigelow.* Oregon,

on the banks of Rogne's river, rare, *W. D. Brackenridge.* Collected also during *Lieut. A. W. Whipple's* exploration for a railway route from the Mississippi River to the Pacific Ocean, near the 35th parallel of latitude, 1853–4.—This elegant little Fern has at first sight, in its ramification and in the general form of the pinnules, such a resemblance to fertile fronds of *Cryptogramme crispa*, that my first hasty inspection led me to refer it without doubt to that plant; but a more accurate examination convinced me that I was in error in so doing. It has not the two kinds of fronds of that plant, and the involucre is of a totally different character, not simply formed of the reflexed margin of the pinnule, but there is an intramarginal thin membranaceous involucre of a distinct texture from the frond. I refer it with little hesitation to *Pellæa*, from all the species of which it is very distinct, as will be seen better from the figure than from any laboured description. I find a peculiarity on the upper side of the pinnules when highly magnified, as shown in one of our figures (Tab. CXXV. f. 2), namely, an appearance of white, close-pressed, parallel hairs lying in the direction of the margins, tapering at each end, like the hairs of some Malpighiaceous plant. A high magnifying power shows that these are not separable from the cuticle, but are rather lodged in it. Can they be looked upon as raphides? Mr. Brackenridge's figure and description of this plant, which I only discovered since my Plate was prepared, are both very faithful, and that author justly remarks its close resemblance (at first sight of course) to *Allosorus acrostichoides*, which we consider the same as *Cryptogramme crispa.* The rigid habit and different nature of the involucres forbid its being correctly referred to *Onychium.*

31. P.? *nudiuscula;* "frondibus pinnatis utrinque pubescentibus, pinnulis linearibus integris infimis subincisis, involucris angustissimis," *Br.*—Pteris nudiuscula, *Br. Prodr. Nov. Holl. p.* 155. Nothochlæna pilosa?, *Hook. et Arn. Bot. of Beech. Voy. p.* 74.

Hab. Tropical New Holland, *Mr. Brown.*—The solitary specimen I possess of this little-known Fern, from the herbarium of the late Capt. Carmichael, to whom it was given by Mr. Brown, has no distinct involucre, and has so many points in common with Dr. Arnott's and my *Nothochlæna pilosa* (Bot. of Beech. Voy. p. 74), that I could have little hesitation in considering them to be one and the same species; but Mr. Brown describes the involucres as "angustissima," and one at least of his own specimens justifies him in doing so. It is well known however to every student of Ferns what a close relationship there is between *Nothochlæna* and the *Pterideæ*, and how difficult it is to decide whether a more or less reflected margin is to be considered an involucre or not. Mr. Brown's plant has the sori arising from the veins apparently in short lines, and therefore would come into *Allosorus*, or *Pellæa* of more recent authors, and I think it right to retain it, for the present at least, among the *Pterideæ*, and we may hope that Dr. Mueller, now botanizing in tropical Australia, will send home perfect and copious specimens to enable us to decide the point in question.

I may observe, with regard to the *Nothochlæna pilosa*, that, besides our original specimens from the Coral Islands, we have received the same from *Mathews* (*n.* 23), and *Cuming* (*n.* 1602) from the Society Islands, as well as from Macao, *Rev. G. H. Vachell*, and from Hongkong, *Dr. Dill;* so it has probably an extensive range.

32. P. *decomposita;* a span to a foot long tufted, caudex thick short horizontal with copious fibres, fronds ovate or subdeltoid (4–8 inches) submembranaceous decompoundly

pinnate, primary pinnæ mostly opposite, their lowest inferior pinnæ elongated and deflexed, pinnules linear-oblong broader and crenate or lobulate in the sterile plant (and confluent) narrower and more or less elongated and linear in the fertile, terminal pinnule elongated subcaudate, involucres occupying the entire length of all the pinnules meeting at the back (as in *Cryptogramme*) downy fringed and waved at the margin, capsules large, stipites and main rachis black rigid, partial rachises winged. (Tab. CXIX. B.)—Allosorus decompositus, *Mart. et Gal. Fil. Mex. p.* 48. *t.* 10. *f.* 2. Allosorus angustifolius, *Pr., according to Liebm. Fil. Mex. p.* 67, *and* Ch. angustifolia, *H.B.K. Nov. Gen. Am.* i. *p.* 21, *which Kunze quotes under his* Onychium angustifolium (*see p.* 123 *of this volume*).

Hab. Mexico, Pacific side, *Beechey;* Western Cordillera of Oaxaca, elev. 4500–6500 feet, *Martens and Galeotti,* "*n.* 6362," *Liebmann;* Sierra San Pedro, Nolasco, etc., *Jurgensen;* Sierra Madre, N. W. Mexico, *Seemann, Dr. Coulter, n.* 1687. Tovar of Venezuela, *Fendler, Plant. Venez. Fil. n.* 90. Guatemala, *Skinner.*—This plant has but slight affinity with *Cheilanthes cuneata** (p. 107), Link, and Kze. Fil. Suppl. t. 36, much more with *Cheilanthes marginata,*† H.B.K. (p. 105); but it is very distinct in the generally larger size, narrower and longer pinnules, the caudate terminal one, and especially the continuous uniform involucres. Some of the lesser fertile pinnules have a near resemblance to those of *Cryptogramme crispa*, Br., but the ramification is more regularly pinnate, and the barren fronds scarcely differ from the fertile fronds, except in the greater breadth of the divisions and in being less compoundly pinnated. Martens and Galeotti's figure fairly represents the plant of the natural size, but the fertile pinnules are very incorrect, especially the involucres. Our figure represents the finest of our specimens, for they vary much in size.

33. P. *hirsuta*, Hook.; subspithameous, caudex creeping thick clothed with dense subulate scales, frond rigid deltoid closely tripinnate below 4-pinnate, primary divisions opposite

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* By an unaccountable error at our p. 108, *Allosorus pulchellus*, Mart. et Gal., is referred to this species: that synonym should be erased.

† We have said, under the list of "dubious species," that *Cheilanthes crenulata*, Link (a Mexican species), is referred by Martens and Galeotti to *Allosorus ciliatus*, Pr., which is the same as our *Cheilanthes marginata*, H.B.K., p. 105. Mettenius however retains it as a good species in his recent important work, 'Filices Hort. Bot. Lips.,' with the following character:—"Rhizoma repens; petiolus 2–3″ longus, ebeneo-fuscus denique glaberrimus; lamina 6–8″ longa, coriacea, glabra, tripinnatisecta; segmenta primaria oblique ovata; secundaria deorsum aucta, una cum tertiariis ala angusta viridi confluentia; tertiaria subpetiolata, linearia, obtusa, infima tripartita, superiora indivisa; omnia leviter crenata. Nervi simplices, apice incrassato, sinum crenarum attingentes et soriferi; sori distincti; margo indusiiformis continuus, membranaceus, rigidiusculus, transverse plicatus, supra soros in crenas expansus; margines utriusque lateris ad costam conniventes."—He quotes as synonyms *Allosorus cæspitosus*, Pr., and Kze. in Linnæa, xxiii. p. 218, *Cheilanthes crenulata*, Link. I have seen no authentic specimen of this plant. It is placed by Mettenius next to *C. marginata.*

and secondary ones generally so, pinnules linear-oblong obtuse often pinnatifid shaggy beneath with minute glossy crisped ferruginous scales, involucrës copious formed of the reflexed margins of the pinnules continuous rather rigid crenato-lobate, rachises compressed and channelled castaneous glossy margined with ferruginous scales, stipes much longer than the frond stout strongly grooved terete slightly scaly near the base.—Allosorus hirsutus, *Presl, Reliq. Hænk.* i. *p.* 59. *t.* 10. *f.* 1 (*not* Pteris hirsuta, *Sw.*). *Kunze in Linnæa*, ix. *p.* 56. Cheilanthes Chilensis, *Fée, Gen. Fil. p.* 156. *Gay, Fl. Chil.* vi. *p.* 194.

Hab. Andes of Chili, *Hænke;* at La Guardia and at Antuco, in South Chili, *Pœppig, C. Gay, Thos. Lobb, Cuming, n.* 199 and 253 (fronds narrower and less branched). Near Valparaiso, "in marshes," *Bridges.*—A very distinct and well-marked species; yet, though an old and well-known plant, the descriptions and figure are entirely overlooked both by Fée and M. Gay, and they have made of it a new species of *Cheilanthes.* The perfect fronds are quite triangular, densely 3–4-pinnate, about 3–4 inches long, beneath of a rich brown, from the deep colour of the rachises, and the dark ferruginous crisped scales, which give a shaggy appearance to the under side of the pinnules, and to the margins of the rachises. Presl's figure well represents the upper side of the plant of the natural size, but it is destitute of any analysis of fructification. He seems to be the only author, except Kunze, to whom this plant is known, yet it is found by every botanist who has sent collections from Chili.

Dubious Species of Pellæa.

Allosorus involutus, *Pr.*, from the Cape, *Thunberg.*—Pteris involuta, *Sw. Syn. Fil. pp.* 104 *and* 300. Kunze, in Linnæa, x. p. 526, says, "A Thunbergio in Prodromo et Fl. Capensi omissa, mihique plane ignota."

Allosorus Domingensis, *Pr.*, seems to be only known as Pteris Domingensis of *Spreng. Herb.*

Allosorus aurantiacus, *Pr.*; "fronds pinnate somewhat hairy above, beneath clothed with a golden farina, pinnæ opposite deeply pinnatifid, segments ovato-oblong obtuse crenate ciliate," *Willd.*—Pteris aurantiaca, *Cav. Præl.* 1801, *n.* 659. *Willd. Sp. Pl.* v. *p.* 382.—New Spain, near Chalma, *Cav.*

Allosorus sulphureus, *Pr.*; "fronds trifoliate, lateral leaflets auriculate at the base ('foliis lateralibus folio breviore ad basin auctis'), intermediate leaflet petiolate all pinnated clothed with sulphur-coloured powder beneath," *Cav. Præl.* 1801, *n.* 667. *Willd. Sp. Pl.* v. *p.* 562.—New Spain, near Chimapan, *Cav.*

Allosorus farinosus, *Kze. in Schk. Fil. Suppl.* ii. *p.* 5. *t.* 103, is Gymnogramme ornithopteris, *Klotzsch in Linn.* xx. p. 413.

10. PTERIS, *Linn., Sw., and Willd. (for the most part).*

(HOOK. GEN. FIL. TAB. LXIV. A.) Heterophlebium, *Fée.* Campteria, *Presl* (HOOK. GEN. FIL. TAB. LXV. A). Litobrochia, *Pr.* (HOOK. GEN. FIL. TAB. LXV. B. f. 6). Doryopteris, *J. Sm.* Amphiblestra, *Pr.* (HOOK. GEN. FIL. TAB. CXX. C.)

Sori marginal, linear, continuous, occupying a slender filiform receptacle in the axis of the involucre. *Involucre* marginal, generally narrow, continuous, formed of the dilated, more or less changed and usually membranaceous margin of the frond, at first revolute, at length often spreading in age, so as to expose the line of fructification.—Ferns *tropical or subtropical and of temperate regions.* Root *sometimes composed of densely tufted fibres from the swollen base of the united stipites, with no perceptible caudex; at other times there is a distinct* caudex *more or less elongated, creeping and scaly.* Fronds *rarely simple and small, more or less lobed or palmate, generally compound and often of a very large size* (1 *to* 5–6 *and more feet*), *mostly of a tender and submembranaceous texture and of a bright green, sometimes coriaceous and very opaque.* Veins *generally very distinct, simple, sometimes flabellate, or pinnate, with the* veinlets *simple or more or less anastomosing: this tendency to become reticulated is sometimes confined to the margins of the pinnules* (Heterophlebium, *Fée*), *or the union of the veins takes place more or less near to the costa, where they form a series of large areoles* (Campteria, *Pr.*), *or the entire frond is reticulated with areoles various in size and form* (Litobrochia, *Pr.*, and Doryopteris, *J. Sm.*), *or lastly the areoles are appendiculate (furnished with one or more free veinlets), clavate at their apices* (Amphiblestra, *Pr.*). Stipes *more or less elongated, and together with the rachis frequently brown or stramineous, while those that have small coriaceous and opaque fronds* (Doryopteris, *J. Sm.*) *and the habit of* Pellæa, *are generally ebeneous, the bases often hairy or scaly.*

It will be seen from the characters and the references above given, that I have taken the bold step, and what many will consider a retrograde movement in botany, in restoring almost entire the original *Pteris* of Linnæus and Swartz and

Willdenow. *Pellæa* (or *Allosorus*) is the only group excluded, and I am far from being convinced that that is a correct measure, and that it should not form rather a section or subgenus of *Pteris*, with which many of its species are so closely allied by nature and the general essential characters.

It may be worth while to examine a little into the supposed advantages or disadvantages to be derived from the changes that have taken place in the genus *Pteris*, since the days of Willdenow.

Bernhardi was the first (in 1806) to propose the separation of *Allosorus* from *Pteris;* and if by his saying it was intended to include (besides *Cheilanthes fragrans* and *Pteris crispa*) "all the *Adianta spuria*" of Swartz, he meant Swartz's second group or section of *Pteris*, "*Adiantoideæ*," which comprises all Swartz's species of the genus *Pteris*, which had the "stipes fuscus *Adianti*," irrespective of any other character. Gaudichaud's characters for dividing *Pteris* into sections, given in Freycinet's Voyage, are too vague to merit much attention, and no one seems to have followed up Bernhardi's views till Mr. Brown's valuable disquisitions on the "Modifications of vascular structure, or the various ramifications of the bundles of vessels or veins of the frond, combined with the relation of the sori to their trunks or branches, as the most advantageous source of character for subdivision, not in *Polypodium* only, but in other extensive genera of Ferns,"* appeared first in the 'Prodromus Fl. Nov. Hollandiæ' (1810), then in Dr. Wallich's 'Plantæ Asiaticæ Rariores' (1830), and the subject was more fully discussed, at a later period, in the 'Flora Javæ' (1838). These induced Dr. and Professor Presl, in his 'Tentamen Pteridographiæ, seu Genera Filicacearum præsertim juxta venarum decursum et distributionem exposita,' 18, to give a degree of importance in the formation of genera far beyond the views of the illustrious author just mentioned, and to separate from the genus *Pteris* of the older authors, besides *Allosorus* (which he makes to include several species), *Cheilanthes*, *Onychium*, *Pteris aquilina*, and its allies, *Haplopteris*,† (*Pteris scolopendrina*, Bory), *Monogonia* (since abolished), characterized by the lowest opposite veins uniting in an acute angle at the apex, *Campteria*, *Litobrochia*, and *Amphiblestera* (already noticed). This work is rendered the more valuable from the number of figures illustrative of his views, in general faithfully, if not artistically, executed. This multiplication of the genera of Ferns, upon what we conceive to be slight grounds, is carried out to a still greater extent in the same author's 'Epimeliæ Botanicæ,' 1849; but no change is there attempted among the *Pterideæ*. The excellent Agardh (Recens. Sp. Pteridis, 1839) excludes the *Allosori* of Bernhardi and Presl, but otherwise preserves the Linnæan genus *Pteris*, and makes an excellent use of the venation, as of great importance for characters of the subdivisions.

Link (in 1841) took a more correct view of *Allosorus*, by confining it to the *Pteris* (Cryptogramme, *Br.*) *crispa*, in which he has been followed by many others. He constituted the genus *Pellæa*, referring to it a tolerably natural group of old *Allosorus*, in which, as explained at p. 131, we have followed him. He

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* Brown, under the description of *Polypodium* (Dipteris) *Horsfieldii*, in 'Flora Javæ,' p. 3.

† Fée places Presl's *Haplopteris* amongst the "Incerta Genera." Moore (Index Filicum, p. xli.) places it next to *Pteris*, and on the authority of original specimens in Herb. Heward, describes the indusium as truly pteroid. I have every reason to believe that the Fern on which I founded my genus *Tæniopteris* (Gen. Fil. t. LXXVI. B), *T. Forbesii*, from the Mozambique coast, a Vittaroid Fern, is identical with it; and there the sori are so sunk, and the edges or margins so dilated, that they may easily be taken for a double involucre; in some cases even the sorus in age conceals the inner of these two supposed involucres, and then the outer one resembles that of a *Pteris;* hence Presl's *Haplopteris*, a name, if the genus were a valid one, is to be preferred to *Tæniopteris* or to *Tæniopsis* of J. Sm., which is identical with it, and of earlier date.

considers the essential character to depend upon the "indusium e margine frondis reflexo in limbum membranaceum transeunte," to distinguish it from "*Pteris*,—indusium margini frondis adnatum, ab ipso distinctum, limbo membranaceo." He has thus preserved *Pteris* nearly in the same state as Professor Agardh, and apparently coming to the same conclusion, quite independent of any knowledge of each other's views.

Mr. J. Smith's "Arrangement and Definition of the Ferns," though read before the Linnæan Society in 1840, was not published till 1842 (in Hook. Journ. of Botany, vol. iv.). This author's views, as he tells us, so nearly coincided with those of Presl, that he thinks it necessary to explain that he never saw Presl's 'Tentamen' till 1838. Here *Allosorus* (Bernhardi, *J. Sm.*) is placed among the *Nudisori*, and reduced to *A. crispus* and its supposed allies, "*A. gracilis*, *A. ciliatus*, Pr., and *A. hirsutus*, Pr.," while the majority are united with *Cassebeera*, Kaulf., and the rest constitute the genus *Platyzoma*, J. Sm., with the exception of *Ceratodactylis*, J. Sm. (*Allosorus*, Kze.), and which I have clearly ascertained to be *Llavea* of Lagasca. *Amphiblestra* is retained, and *Litobrochia*, with which *Campteria* is united, and *Doryopteris* is formed, at the expense of *Litobrochia*, of *Pteris palmata* and its allies: but we scarcely see on what ground, since the *Cassebeera pedata* and its affinities, which hold the same relation to that genus that *P. palmata* does to *Litobrochia*, remain there. *Pteris* is confined to the free-veined species, and stands exactly as in Presl.*

The only remaining author worthy of notice, who has written on the Filices on a comprehensive scale, and whose works generally on the Ferns are full of the most valuable information, M. Fée, has, in his 'Genera Filicum' (his 'Cinquième Mémoire sur la famille des Fougères') in the main followed Presl's views. He establishes the genus *Heterophlebium* (already noticed) for the *Pteris grandiflora*, L., and other authors. His *Pteris* however includes the *Aquilinæ*-group, which Presl refers to *Allosorus:* and he adopts *Pellæa* of Link, for the species of *Allosorus*, as we have ourselves done. *Doryopteris* is made to include the *Pteris articulata* of Kaulfuss, which, though agreeing in venation, and perhaps texture of frond, is at variance with the character of the genus: "Les frondes ont une forme pédiaire ou hastée, qui donne à ses plantes un port curieux;" whereas *P. articulata* has quite the habit of *Pellæa*, especially of *Pellæa hastata*.

Having thus enlarged upon the changes the genera have undergone, according to the views of some of the more recent writers on Ferns, in the old genus *Pteris*, it may be as well here, and to avoid needless repetition, to express our opinion that as new light is continually being thrown upon this family of plants, it is premature to sanction the great multiplication of genera by laying stress on the nature of the venation when unaccompanied by any corresponding changes in fructification or any marked differences in habit, and more philosophical to consider such groups in the light of sections or subgenera. The importance of the vascular structure is acknowledged; an arrangement, to say the least, equally natural, is preserved, and some degree of stability is given to names invented and sanctioned by the most illustrious botanists that ever lived.†

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* In his very recent 'Catalogue of Ferns in the Royal Gardens of Kew' (1856), Mr. J. Smith adopts *Cryptogramme*, Br., removes it from the *Nudisori* (or *Polypodieæ*), and transfers it to *Pterideæ*, and he adopts *Pellæa* of Link for the majority of species of *Platyloma*, and *Campteria* is in part only separated from *Litobrochia*.

† In the first number of a little work just put into my hands, while preparing this sheet, entitled 'Index Filicum,' by Mr. Thomas Moore, it is shown (though I do not vouch for the accuracy) that the genus *Pteris* alone, and not the *Pteris* of Linnæus, but of more recent writers, Agardh, Fée, etc., is described under no less than eighteen different generic names, *Cheilanthes* under fourteen, and *Asplenium* under nineteen!

§ EUPTERIS.—*Veins free, not anastomosing.*

* *Fronds pinnated; pinnæ all undivided.*

1. Pt. (Eupteris) *longifolia*, L.; large (1–2 feet), caudex short stout knotty, frond lanceolate attenuated below pinnate, pinnules numerous approximate linear-lanceolate elongated gradually acuminated, terminal one sometimes the largest and petiolate, the base truncate or cordate auriculate and even hastate, lower pinnules gradually shorter, stipes more or less chaffy.—*Linn. Sp. Pl. p.* 1531. *Jacq. Hort. Schœnbr. t.* 399–400. *Schkuhr, Fil. t.* 88. *Ag. Sp. Pterid. p.* 3. Pt. costata, *Bory in Belang. Voy. Willd. Blume. Hook. et Arn. Bot. of Beech. Voy. and others, p.* 250. *t.* 251. Pt. vittata, *L. Willd. Sp. Pl.* v. *p.* 368. *Osb. It. t.* 4. *Sw.* Pt. obliqua, *Försk.* Pt. lanceolata, *Desf.* Pt. ensifolia, *Sw. Willd.* Pt. Alpinii, *Desv.* Pt. semihirta, *Lk.* Pt. acuminatissima, *Bl. En. Fil. Jav. p.* 208. Pt. amplectens, *Wall. Cat.* (*et in Herb. Nostr.*). *Ag. Sp. Pterid. p.* 1. Pt. diversifolia, *Sw. Syn. Fil. p.* 96 *et* 288. *Ag. Sp. Pterid. p.* 6. Pt. trapezoides, *Burm. Ind. t.* 66. *f.* 2. Pt. microdonta, *Gaud. Voy. p.* 387. Pt. tenuifolia, *Brackenridge in Bot. of U. St. Explor. Exped. p.* 112. Mr. Webb adds to these synonyms Pteris Indica, *Poir.*, Pt. inæquilateralis, *Poir.*, and Pt. Guichenotiana, *Gaudich.* and *Decaisne*, Hab. Timor: to which we will also venture to add Pt. æqualis, *Presl, Reliq. Hænk.* i. *p.* 54, Pt. Bahamensis, *Fée, Gen. p.* 125. *Plum. Fil. t.* 69.—β. *sagittata*, pinnules auriculato-sagittate at the base (monstrosity). Pt. stipularis, *L. Sw. Willd.*—γ. pinnules very narrow linear rigid.

Hab. "Sparsa est hæc Filix per totius terræ orbis regiones temperatas atque æquinoctiales, et 37 gradum in Europa attingit," as Mr. Webb justly observes in his 'Flora of the Canaries,' and as my Herbarium alone would abundantly testify. Most authors give the East and West Indies, Arabia, Mauritius, Bourbon, Algeria, and Spain. I may add as follows, from my Herbarium: in Europe, Canaries, *Webb and others;* Malaga, and about Yunguera in Spain, *Boissier and Reuter*, and other places in Spain, *Bourgeau, n.* 1545; Castania, near Messina and Ischia, Dalmatia, *Dr. Alexander.* Abyssinia, *W. Schimper, n.* 279. Mascato, *Aucher-Éloy, n.* 5489. In the New World, Jamaica, Cuba, Bahamas, St. Domingo, etc., apparently almost confined to the W. Indian islands; very rare on the continent of America; Mexico, *Presl* (and see under var. γ.). Africa, St. Antonio and St. Vincent, *Vogel;* Isle San Nicol, Cape de Verds, *Forbes;* Madagascar, *Boivin and Forbes.* Macalisberg, interior of S. Eastern Africa, *Burke.* On the continent of India almost universal, Nynee Tal in the north-west, *T. Thomson*, west and east to the Irawaddy, *Wallich;* Ceylon, China, from *various travellers;* Loo-choo, *Beechey.* Frequent in the Malay Archipelago, *Wallich*, (Borneo) *Motley;* Malacca, *Griffith;* Singapore, *Lobb;* Penang, *Lady Dalhousie;* Java, *Blume;* Amboyna (*Herb. Webb.*); Luzon, *Cuming.* Feejee Islands, *Milne.* Pacific islands: Tongataboo, *Brackenridge;* New Hebrides, Aneiteum, and Isle of Pines, *Mac-*

gillivray, Milne, Barclay. S. Australia; Rivers Mitchell and Buchan, *Dr. F. Mueller.*—*Var.* β. Isle of Bravie, Senegambia, *Dr. Brunner.*—γ. Venezuela, *Moritz, n.* 15, *Fendler, n.* 105, *Birschill.*

To avoid giving what might be considered too long a catalogue of varieties for this widely diffused and readily distinguished plant, I have thought it better to include in the specific character the comparatively trifling differences in the forms of the pinnæ, rather than to group them under the six several heads (only depending on the more or less dilated form of the base of the pinnæ) as the excellent Agardh has done in his 'Recensio Specierum Generis Pteridis.' It is indeed quite true that many of those forms are considered by authors as distinct species, but more frequently they are so esteemed from a false notion that, however a plant of the *New* World may resemble another of the *Old* World, their widely separated localities forbid their being considered specifically the same. To the general distribution however of this plant in warm or tropical countries we have this remarkable exception, viz., though our earliest knowledge of the species is derived from the West Indian islands, St. Domingo, Jamaica, I have no knowledge of its being found upon the vast *continent* of America, either north or south, except in Mexico (*Presl*), and in Venezuela, *Moritz and Fendler.* The specimens from the latter country, and from different localities, are remarkable for their stiff, rigid habit, and very narrow pinnæ. The most remarkable form of the plant is what we have here called var. β. *sagittata.* The only specimen we have seen is from Dr. Brunner, gathered in Senegambia; and it is so abnormal a form that it may almost be looked upon as a monstrosity or disease: but a variety of the same nature has been figured by Plumier in his 'Fougères de l'Amérique' (by which country the French West Indian islands are implied), tab. 70, a figure which, like almost all the figures of that author, is greatly exaggerated. An authentic specimen of *Pt. æqualis,* from Presl himself, proves that to be a common form of our plant. We have plants before us, which vary in height from 4–5 inches to 4½ feet, as grown on some rockwork in a greenhouse.

2. Pt. (Eupteris) *Moluccana,* Bl.; frond glabrous ample pinnate tall broad-oblong (not attenuated at the base), pinnæ elongated broad-linear subfalcate obliquely cuneato-attenuate at the base nearly sessile firm-membranaceous satiny narrow caudato-acuminate and spinuloso-serrate at the apex very finely transversely striated with the close-placed but (on both sides) conspicuous simple or forked veins, involucres narrow continuous, rachis subtetragonous furrowed at the sides purple-brown glossy. (Tab. CXII. B.)—Pteris Moluccana, *Blume, Enum. Fil. Jav. p.* 208. *Ag. Sp. Pterid. p.* 7. Pt. Indica, *Gaud. Voy. p.* 386, *non Poir.* (*fide Agardh*). *Decaisne, Herb. Timor. p.* 20.

Hab. Java, *Blume.* Island of Pisang, *Gaudichaud.* Amboyna (*Herb. Nostr. from Labillardière's Herb.*), Isle of Jobie, north of New Guinea, *Barclay.*—Apparently a rare species, wholly confined to the Malay Islands, but a very beautiful one, from the great length and glossy bright green (quite satiny), and close, minute, yet prominent parallel venation. Its nearest affinity is with *Pteris* (§ Heterophlebium) *grandifolium,* but the venation will at once distinguish it.

3. Pt. (Eupteris) *opaca,* J. Sm.; frond glabrous ample tall broad-oblong (not narrowed at the base) pinnate, pinnæ

elongated broad-linear subfalcate obliquely attenuate at the base nearly sessile firm subcoriaceous very opaque with a short but finely acuminated entire point, uppermost ones decurrent, sterile ones margined beneath with the slightly inflexed edge, veins quite obsolete above, beneath forming very close indistinct transverse striæ, involucres very narrow continuous, stipes and rachis (subterete furrowed on one side) and midrib beneath pale-brown and very glossy. (Tab. CXIV. A.)—Pteris opaca, *J. Smith, En. Fil. Philipp. in Hook. Journ. of Bot.* iii. *p.* 403 (*name only*). Pycnodoria opaca, *Presl, Epimel. Bot. p.* 100.

Hab. Isle of Samar, in the Philippines, *Cuming, n.* 342.—It is not the limited number of words that constituted the Linnæan law for framing a specific character, that will suffice to distinguish this from the preceding (*Pt. Moluccana*), and yet they are truly different. The present is to be recognized by the usually smaller pinnæ, their opaque texture and very indistinct nervation, quite obsolete on the upper side, beneath not to be perceived without the use of a lens, and then only exhibiting very closely placed indistinct striæ. One of our specimens has forty-five pinnæ, another has five, one only three; in the latter cases the terminal pinna is much elongated, and is, in one case, a foot and a half long!

We are unable to conceive why M. Presl has formed a new genus of this, *Pycnodoria* (*πυκνος, crassus*, and *δορα, cutis*). No doubt it has a thick and opaque frond in comparison with its close ally, *Pt. Moluccana*, but he attributes to it the involucre or indusium of *Lindsæaceæ*: "A Pteride, quacum J. Smith commiscuit, differt indusio proprio Lindsæaceo." On the closest inspection of the involucre, it is as represented in our figure, and we agree with M. Fée, who observes, respecting *Pycnodoria*, "Nous ne voyons pas en quoi elle diffère des autres *Pteris*. Le port est le même ainsi que l'organisation," etc.

** *Fronds pinnated, lower pinnæ more or less divided; pinnules distinct sometimes confluent.*—The species of the previous subsection have the fronds simply pinnated; those of the present have the lower pinnæ generally again pinnated, indicating a passage to the truly bi-tripinnated kinds.

4. Pt. (Eupteris) *Cretica*, L.; a foot and a half (more or less) high, caudex short thick subrepent, frond often a foot long broad-ovate more or less acuminate firm coriaceo-membranaceous bright-green glossy, pinnæ 3 to 13 or 14 on each side rather remote a finger's length to a span long, sterile ones lanceolate, fertile ones linear-lanceolate acuminate sometimes very much so sessile or the upper ones more or less decurrent, lowest pair and frequently 2 or 3 or more pairs above them bi-tri- (or more) partite or pinnated, the segments mostly on the lower half, sterile portions strongly spinuloso-serrated (rarely obtusely serrate or subentire), veins simple or forked close almost horizontal, involucres quite marginal narrow, stipes generally longer than the frond, and the rachises stramineous or pale-brown smooth or minutely

rough upon the surface.—*Linn. Mant. p.* 130. *Sw. Syn. Fil. p.* 96. *Willd. Sp. Pl.* v. *p.* 374. *Ag. Sp. Pterid. p.* 9. Pteris semiserrata, *Försk.* Pt. læta, *Wall. Cat. n.* 95. Pt. heterophyllus, *Poir. Schkuhr, Fil. t.* 90. Pt. serraria, *Sw. Syn. Fil. p.* 96. *t.* 289. *Willd. etc.* Pt. pentaphylla, *Willd.* Pt. nervosa, *Thunb. Fl. Jap. p.* 332. *Wall. Cat. n.* 96. Pt. vittata, *Bory in Belang. Voy.* Pt. multiaurita, *Ag. Pterid. p.* 12. (*taller form, and with more numerous pinnæ*). Pt. triphylla, *Mart. et Gal. p.* 51. *t.* 31 (*not Ag.*).

Var. *stenophylla;* fronds digitate or subpinnate at the apex of the stipes, pinnæ 3–5 entire or nearly entire.—Pt. stenophylla, *Hook. et Grev. Ic. Fil. t.* 130. *Ag. Sp. Pterid. p.* 11. Pt. digitata, *Wall. Cat. n.* 91. Pt. angusta, *Wall. in Herb. Hook.* Pt. tæniosa, *J. Sm. in Hook. Journ. of Bot.* iii. *p.* 405. (*name only*).

Hab. Perhaps the most northern localities recorded for this Fern are given by *Ledebour*, in 'Fl. Rossica;' Turcomania, in Uralian Siberia, at the river Baker in the Caucasian provinces; South of Switzerland, Nice, and various countries bordering on the Mediterranean, Corsica, Crete, etc. etc. Arabia, *Förskal;* Abyssinia, *Schimper, n.* 1312. S. Africa, east of the Cape, Uitenhage, *Zeyher, Drége, Harvey;* Macalisberg, *Sanderson.* Persia; Gurril, *Dr. Fischer.* India, in various localities, and generally exactly the European form; Nilghiri, *MacIvor, Dr. Schmidt;* Calcutta to Nepal, *Wallich;* Simla, *Col. Bates;* Mussoorie, *Dr. T. Thomson, Jacquemont;* Punjaub, *Jacquemont;* Boutan, *Booth* (fertile pinnæ an inch broad); Sikkim-Himalaya, 6000 feet, Ratery Valley, and Khasia, *Hooker and Thomson;* Kumaon, 3000 feet, *Strachey and Winterbottom;* Eastern Nepal (small state of the plant, with generally few and subdigitate pinnæ, approaching our *Pt. Tamburii*, but the pinnules are spinuloso-serrate), *Wallich.* Isle Bourbon (*Herb. Mus. Paris.*), *Dr. Wallich;* Penang (stipes rough), *Lady Dalhousie* (upper pinnæ decurrent); Java, *Blume;* Luzon, *Cuming, n.* 45; Ceylon, *Mrs. General Walker* (pinnæ numerous, lowest pair petiolate and pinnate, stipes rough), *Gardner;* Sandwich Islands, *Douglas.* Feejee Islands, *Milne.* Loo-choo, *Beechey.* N. America, rocks on the Apalacha river (ternate quinate and pinnate, upper pinnæ sometimes decurrent). Mexico, *Liebmann, Galeotti, n.* 6377, *Linden, n.* 1545 (upper pinnæ very decurrent), *Dr. Coulter;* Guatemala, *Mr. Skinner* (upper pinnules decurrent). S. America, Entre Rios, *Tweedie.*

Var. *stenophylla*, N. India, Nepal, Kumaon, *Wallich, Strachey and Winterbottom;* Ghalti and near Salokor, *Edgeworth;* Khasia, *Griffith* (small). Philippine Islands, *Cuming, n.* 283 (taller and approaching the ordinary form of the species, but pinnæ narrower).—Under this species synonyms might be multiplied and further localities added, but enough has been given to show that the species is widely dispersed, and hence it is that, as I have often had occasion to observe, new species have been made under an impression that an American or Indian species must be distinct from a European one. Considering how widely it is dispersed, it is remarkable to find it assume so few very distinct forms. Our only fear is that we ought to have united some of the following species with it.

5. Pt. (Eupteris) *dactylina*, Hook.; 4 inches to a foot high, caudex creeping sending out wiry fibres, fronds subcoriaceo-membranaceous rather rigid 2–6 inches long digitate,

pinnæ 3–5 subradiate linear sessile slightly tapering below much and narrowly acuminated the sterile portions coarsely and deeply spinuloso-serrate especially towards the apex, involucres rather broad subintramarginal membranaceous close-pressed, veins simple, stipites numerous tufted very slender and as well as the midribs of the pinnæ (very prominent beneath) stramineous. (Tab. CXXX. A.)

Hab. Dry sheltered rocks, Eastern Nepal, and Sikkim-Himalaya, elev. about 9000 feet, *Drs. Hooker and Thomson.*—Different as this may appear at first sight from the ordinary and many of the extraordinary forms of *Pteris Cretica*, it is nevertheless of the same group with that species, and very nearly allied to it, and could I see any variation, any passage, from what I have described as the normal form, towards *Pt. Cretica*, I would not have ventured to place it in the rank of a species; but all Dr. Hooker's specimens have the remarkably graceful slender character represented in our figure; the pinnæ spring from the apex of the slender pale-coloured stipes; the number of pinnæ is usually five, sometimes four or three. When three, the pinnæ are alike, and rise from one common point; when four, each is geminate or united at the base into two pairs; when five, the central one is simple, and the lateral pairs are geminate: and it is this character of the lower pair of pinnæ being compound or partite which shows the affinity with *Pt. Cretica*, to which may be added another common to the two species: the very coarse and deep serratures, each serrature terminated with a spine or bristle. The caudex is generally rather short, but horizontal and creeping, bearing very numerous stipites from the upper side, and numerous descending, slender, but wiry roots below. A slight variety may be noticed with the serratures of the pinnæ muticous.

6. Pt. (Eupteris) *pellucida*, Pr.; 1½ to 2 and even 3 feet high, caudex short thick scarcely creeping, frond a foot and more long sometimes quite simple (Tab. CXXIX. B.) broad-lanceolate mostly ternate or pinnate ovate in circumscription coriaceo-membranaceous bright-green lucid (rather than pellucid), pinnæ 3 to 11 or more, generally broad (an inch to 1½) 6–10 inches long, entire or rarely subserrated at the very acuminated apex, the margin often crisped sessile or the upper ones sometimes decurrent generally all entire or lowest pair bipartite, veins simple or forked close almost horizontal, involucres quite marginal narrow, stipes very variable in length stramineous or tawny smooth or subscabrous. (Tab. CXXIX. B. represents only the simple-fronded form.)—*Presl, Reliq. Hænk. p.* 55. *Ag. Sp. Pterid. p.* 10, *in note.* Pt. nervosa? *Wall. Cat. n.* 96 (*not Thunb.*). Pt. crispata, *Wall. MS.* Pt. serrata, *Wall. MS.*

Hab. India; Luzon, *Hænke, Cuming, n.* 85. Irawaddy, *Wallich.* Mishmee and Khasia, *Griffith;* Chittagong and Cachar, etc., *Hooker and Thomson.* Assam, *Simons.* Nepal, Kumaon, Sylhet, *Wallich, Col. Bates.*—This Fern is briefly described only by Presl (l. c.), from sterile specimens, as it would *appear*, quoted by Agardh, nominally retained as a species by J. Smith and Fée, and Cuming's

n. 85 is probably correctly referred to it. Assuredly if the *extreme* varieties of this plant and of *Pt. Cretica* were alone taken into consideration, the two would appear very distinct; but I am myself disposed to consider the present form mainly due to peculiarity of climate, the several specimens I have referable to it being natives of the Malay Archipelago and Peninsula, and extending, as so many Malayan plants do, thence towards Nepal. The main feature in this plant is the large size of the pinnæ; and, in the greater proportion of specimens, the fronds are simply pinnated even to the base, with the lower pair rarely divided: such specimens then having very much the appearance of small individuals of *Pteris* (§ Heterophlebium) *grandifolium*, of the W. Indies, from which however the venation will at once distinguish it. The points of the pinnæ too are almost invariably entire, and never in the least spinulose: and, what is very remarkable, it is not uncommon for the fronds to be quite simple (undivided) even when fructified (see our Tab. CXXIX. A.): these sometimes apart from the pinnated state, sometimes from the same root as they. Presl, who calls the species *pellucida*, probably intended it to mean shining or glossy (as *pellucidulus* is explained to mean), for it is in reality much more opaque than the *Pt. Cretica*, the species with which he himself compares it.

7. Pt. (Eupteris) *umbrosa*, Br.; frond 1½–2 feet high pinnated subcoriaceo-membranaceous dark-green glossy, pinnæ 15–17 (upper ones chiefly) subopposite narrow-lanceolate very acuminate finely serrated in the sterile portions particularly at the apices their bases singularly decurrent, lowest pair deeply bi-tri-quadripartite, the lobes chiefly pointing downwards, involucres continuous narrow, stipes rough and as well as the rachis (broadly winged with the decurrent pinnæ) tawny. (TAB. CXXX. B.)—*Br. Prodr. Fl. Nov. Holl. p.* 154. *Ag. Sp. Pterid. p.* 13.

Hab. Australia; Port Jackson, *Brown*, *Sieber*, *n.* 128, *Brackenridge*. Port Stephen, *Captain King*. N. Australia, *Dr. F. Mueller*.—Assuredly very nearly allied to *Pt. Cretica*, but remarkable for the singularly decurrent pinnules; and when the pinnules are exactly opposite, for their decurrent bases, which are often a little contracted above, and give an urn-like form to the winged internodes of the main rachis. When the pinnæ are alternate and distant, the decurrent wing is much more uniform. The veins are simple or forked.

8. Pt. (Eupteris) *venulosa*, Bl.; "frond pinnate, pinnæ opposite linear-lanceolate glabrous, inferior ones subpetiolate 2–3-partite, the rest decurrent, sterile ones coarsely crenulate at the apex, fertile ones narrower and subentire, stipes and rachis glossy."—*Blume, En. Fil. Jav. p.* 209. *Ag. Sp. Pterid. p.* 13.

Hab. Wooded mountains in Java, *Blume*.—"Fronds with the stipes about 2 feet high. Stipites very smooth, purplish-chestnut colour. Pairs of pinnæ 5–6, each of them joined to the inferior one by a decurrent auricle, the lowest only separate and distinct. Sterile pinnæ lanceolate, half an inch broad, coarsely and obtusely serrated, fertile quite linear, superior ones simple, lowest (in the examples seen) bipartite and apart from the rest. Veins simply forked." *Ag.*—Not having had any opportunity of seeing an authentic sample of this plant myself, I have copied the specific character from Blume, and the brief description from

Agardh, who drew up his notes from specimens in the Paris Herbarium. Blume says of it, "Near *Pt. serrulata*, Linn., but distinct in the pinnæ not being sharply serrated:" and Agardh observes, "Between *Pt. scabripes*" (which I consider identical with *Pt. Cretica*, and *Pt. serrulata*, L.), "but differs from the former in the more numerous and decurrent pinnæ, and from the latter in the breadth of the pinnæ."—It is probably some large state of *Pt. Cretica* with decurrent pinnæ, or of *Pt. umbrosa*.

9. Pt. (Eupteris) *aspera*, Fée; "fronds oval-lanceolate multifrondulate, stipes spinescent squamose fulvous, frondules narrow sessile auriculate opposite at the base above alternate, margins convolute glabrous linear very long-acuminated, mesoneure robust, sporothecia continuous, indusium narrow often elegantly crenulated, receptacle slender linear, sporangia ovoid, annulus 18-articulate, spores trigonous blackish."—*Fée, Gen. Fil. p.* 126 (*not Lam.*).

Hab. Isle of Bourbon (*Montbrison*).—"Tall, flexible; pinnules 40-jugate." "Longueur totale 78–80 centim. Les pinnules centrales ont environ 10–12 centim. de long sur 4 millim. de large; les entre-nœuds laissent entre eux un intervalle de 9–12 millim."—I am unacquainted with this, and dare not venture to offer an opinion respecting its affinities. It is probably nearly allied to a simply pinnated form of *Pt. Cretica*, inasmuch as the author places it between *Pt. stenophylla*, Hook. and Gr. (*Pt. Cretica*, var.), and Pt. pellucida, *Presl, Cum. Philipp. n.* 85.

10. Pt. (Eupteris) *crenata*, Sw.; 1½–2 feet and more high, caudex creeping scaly with long subulate rigid curved scales, fronds 6–8 inches to a foot and more long ovate or (fertile) lanceolate submembranaceous firm bipinnate, terminal pinna much elongated often exceedingly long and caudate generally auriculate on each side at the base, sterile pinnules oblong or obovate obtuse half an inch long coarsely serrated sessile very often confluent and more or less decurrent sharply serrated, veinlets simple or forked thickened at the apex, fertile pinnules linear more or less elongated often much acuminated serrated at the sterile apex, involucre intramarginal occupying nearly the whole length of the pinnules, stipites slender smooth stramineous short in the sterile fronds much elongated. (Tab. CXXVII. A.)—*Sw. Syn. Fil. p.* 96 *et* 290. *Willd. Sp. Pl. p.* 373. *Br. Prodr. p.* 154. *Ag. Sp. Pterid. p.* 14. Pt. ensiformis, *Wall. Cat. n.* 2481, and Pt. multidentata, *n.* 2681. Pt. caudata, *Loureiro, Cochin. p.* 835. Pt. heterodactyla, "*Reinw.*" *J. Sm. in Hook. Journ. of Bot.* iii. *p.* 405, *name only*. *Burm. Zeyl. t.* 87.

Hab. E. Indies, Tranquebar; Malabar coast, *Dr. Wight, n.* 82. Gualpara, Madras, Sylhet, *Dr. Wallich;* Khasia, and Terrya Ghat, below Darjeeling, *Hooker and Thomson;* Bootan, *Booth.* Assam, *Griffith.* Ceylon, abundant. China:

Chusan, *Alexander;* Hongkong, *Col. Champion.* Luzon, *Cuming, n.* 45 and 46, *Thomas Lobb.* S. Pacific islands, Feejee, N. Hebrides, Aneiteum, abundant, *Milne, Brackenridge.* Tropical N. Holland, *Sir Joseph Banks.*—A very variable plant it must be allowed, for whereas some of our specimens have so much in common with *Pt. mutilata*, that we have been almost led to think the two might be united, others are so different that it would seem from them as if there could be no connection between them. Among the most remarkable of these are Cuming's specimens from Luzon, *n.* 46, in which the primary pinnæ (in the sterile plant) may be said to be reduced to the terminal pinnules, which are more than 6 inches long and ⅛ of an inch broad, the two or three lower pinnules being rather auricles at the base than real pinnules, and confluent with the principal one: the terminal pinna of the frond is nearly 10 inches long, and much acuminated. Burmann's figure above quoted is a fair representation of the type of the species.

11. Pt. (Eupteris) *mutilata*, L.; a span to a foot and more high, caudex short subrepent, roots tufted, fronds 3–5 inches long ovato-lanceolate acuminate submembranaceous firm pinnate, lower pinnæ (rarely any superior ones) again pinnate, pinnules subsessile those of the sterile fronds ½–¾ of an inch long elliptical a little waved at the margin but entire with a slender cartilaginous edge, rarely minutely denticulate towards the apex often mucronate, upper ones a little decurrent, terminal one caudate, veinlets simple or forked slightly incrassated at the apex, pinnules of the fertile fronds longer and narrower more apart linear-lanceolate obtuse, involucre marginal continuous round the apex very narrow membranaceous, stipites slender stramineous castaneous at the base very glossy, those of the fertile fronds thrice longer than the sterile ones. (Tab. CXXXI. A.)—*Linn. Sp. Pl. p.* 1533. *Sw. Syn. Fil. p.* 99. *Willd. Sp. Pl.* v. *p.* 378. *Ag. Sp. Pterid. p.* 15. *Plum. Fil. t.* 51.—*β.* fertile fronds larger bipinnate, pinnules numerous more approximate.—Pt. concinna, *Heward in Mag. of Nat. Hist. N. Ser.* 1838, *p.* 461.

Hab. West Indies (*Sw.*); Jamaica (*Willd.*); Hispaniola, *Plumier;* Cuba, *Pœppig, E. Otto, n.* 65, *Linden, n.* 1872.—*β.* Jamaica, *Mr. Heward.*—To me this appears to be a very distinct species of *Pteris*, especially when perfect specimens are seen, with the sterile and fertile fronds arising from the same plant. If Plumier's figure above quoted is to be considered the type of the species, it is much larger than any individuals that have come under my notice, but the absence of the sterile frond is to be regretted in that figure. Agardh's description is, as usual, very correct; he has not omitted to notice the white cartilaginous edge of the sterile pinnules. Our tallest fertile specimen is nearly a foot and a half long, and its stipes is always longer than the sterile frond, stipes included. My smallest perfect specimens are a span high. It does not appear to be a frequent species. I only possess it myself from Cuba, but thence from three different collectors. It is distributed in Linden's collection as *Pteris heterophylla*, L., from which it is very distinct.—We have sometimes had our doubts whether it may not possibly be a form of the Indian *Pt. crenata;* and if that were not exclusively confined to the warm parts of the Old World, or if this were not confined to the W. Indian islands, we should endeavour, and expect, to find passages from the one

to the other: the present however is much the smaller plant, the sterile pinnules are shortly petiolate, free and distinct, not confluent with the adjacent ones, entire or nearly so. The terminal pinnæ never become so remarkably elongated as in the *Pt. crenata* (for which Loureiro's name of "*Pt. caudata*" is a very appropriate one), and we do not find that gradual change from the sterile into a fertile frond that is common in *Pt. crenata*. Perhaps, though a very minute character, that which distinguishes this species the most certainly from *Pt. crenata* is the slender cartilaginous margin of the sterile pinnules. This structure does not exist at all in *Pt. Cretica*, nor do the pinnæ, in our present species, show any disposition to become confluent. In the fertile fronds, too, the pinnules are not only sessile, but decurrent for a short way upon the rachis.

I think I am correct in referring Mr. Heward's *Pt. concinna* to *Pt. mutilata*, as a more compound state or variety. Mr. Smith's specimens, all that I have seen, are only fertile fronds.

12. Pt. (Eupteris) *Hookeriana*, Ag.; "frond pinnate, pinnæ on each side 5–6, upper ones sessile, 2–3 of the inferior ones petiolulate, sterile ones serrated, stipes smooth stramineous trisulcate," *Ag.—Ag. Sp. Pterid. p.* 12.

Hab. Ceylon, *Emerson, Mrs. General Walker, Gardner, n.* 1242.—"Species," says Agardh, "ut crediderim, bene distincta, inter antecedentes simpliciores sequentesque pinnulatas, quasi intermedia. Ab antecedente," *Pt. multiaurita*, Ag., which I consider simply a much developed form of *Pt. Cretica*, "substantia coriacea, pinnis paucioribus attamen magis divisa, earumque forma facile distinguitur." Specimens in our Herbarium, which are the authority for this species, differ in no essential particulars from *Pt. Cretica*.

13. Pt. (Eupteris) *scabripes*, Wall.; "frond pinnate, pinnæ on each side 2–3 sessile, uppermost ones decurrenti-confluent, lowest bi- or tri-partite, sterile ones lanceolate serrate, fertile ones linear-ensiform, veins once forked, stipes scabrous black-purplish," *Ag.—Wall. Cat. n.* 9. *Ag. Sp. Pterid. p.* 11.

Hab. Mountains of Penang, *Wallich.*—This again, I fear, is only a variety of *Pt. Cretica*, with dark-coloured scabrous stipes, yet the careful Agardh held it to be distinct.

14. Pt. (Eupteris) *prionitis*; "fronds pinnate unequally bipartite at the base sometimes pinnatifid, rachis pale striated glabrous, frondules shortly petiolate rather obtuse rounded at the base entire, sterile ones linear-lanceolate acuminate serrated above with unequal teeth crenate below the base entire, nervelets bifurcate slender not reaching to the margin, fertile ones linear crenate towards the sterile apex, rhizome about as thick as a swan's quill, sporothecia narrow, indusia thin membranaceous, sporangia ovate, annulus of twenty joints, spores thick trigonous, sporangiastra intestiniform torulose contorted and whitish," *Fée, Gen. Fil. p.* 127.

Hab. "Philippine Islands, *Cuming, n.* 46."—Mr. Cuming's *Pteris*, n. 46, of the Philippine Islands, both Mr. J. Smith and myself have without hesitation

referred to *Pt. crenata*, Sw. As M. Fée however remarks that his plant so numbered is not the *Pt. crenata*, Sw., it is probable that some other Fern has been distributed, having the same number, but with which we are not acquainted.

15. Pt. (Eupteris) *heterophylla*, L.; a span to a foot high, caudex scarcely any, roots fibrous cæspitose, fronds submembranaceous ovate bi-tripinnate, pinnæ and pinnules subopposite, pinnules of the sterile fronds obovato-oblong obtuse deeply and coarsely serrated the obliquely cuneate base tapering into a short petiole, veinlets simple or forked clavate at the apex, fertile pinnules narrow-oblong with a few coarse serratures only at the apex, involucres membranaceous subintramarginal short not extending to the base or apex, stipites slender glossy stramineous generally longer than the fronds, rachises slightly winged.—*Linn. Sp. Pl. p.* 153. *Sw. Syn. Fil. p.* 101. *Willd. Sp. Pl.* v. *p.* 394. *Ag. Pterid. p.* 15. *Hook. Bot. Mag. t.* 4925. *Fée, Gen. Fil. p.* 125, 126. *Plum. Fil. p.* 84. *t.* 37. *Sloane, Jam.* i. *t.* 53. *f.* 2.

Hab. West Indies: Jamaica, *Sloane, M'Fadyen, Purdie, Dr. Alexander;* St. Domingo, *Plumier;* Cuba, *Linden, C. Wright, Pl. Cub. n.* 859. Brazil: Rio, *Lady Calcott.*—Pinnules from ½ an inch to an inch long. A very distinct species of *Pteris*, wholly confined to tropical America, and chiefly to the W. Indian islands. The constant accompaniment of barren fronds from the same caudex or root as the fertile one, and the general form of the pinnules, remind one of *Cryptogramme crispa.*

16. Pt. (Eupteris) *laurea*, Desv.; "fronds bipinnate, pinnæ triphyllous, lowest ones subpinnulate, pinnules petiolate lanceolate subduplicato-serrate, fertile repand, veins forked, stipes smooth," *Ag.*—"*Desv. Prodr. Fil. p.* 299 (*fide specim. in Herb. Thouars, named by Desvaux himself*)." *Ag. Pterid. p.* 16.

Hab. Madagascar, *Goudot* (*Herb. Delessert, and Mus. Paris.*).—"Frond about 3 feet high. Stipes the size of a goose-quill, clothed at the base with brown, linear, attenuated scales, with a black costa. Pinnæ all triphyllous, the lowermost, in one specimen, pentaphyllous, on a petiole an inch long, 3 inches nearly apart. Pinnules linear-lanceolate; terminal ones long; lateral ones short-petiolate; sterile ones at first obsoletely, afterwards more distinctly, duplicato-serrate; fertile ones slightly repand. Veins forked, sometimes below united and arched," *Ag.*—Of this species I know nothing, and should probably not have noticed it if I had been only guided by Desvaux's description: but Agardh has given the above character and notes from authentic specimens, though he says nothing of its affinities. I follow him in placing it near *Pt. mutilata*, with which however it can have no natural relationship, and the veins are said to be sometimes united and arched.

17. Pt. (Eupteris) *heteromorpha*, Fée; 1½–2 feet high erect firm, caudex scarcely any, roots wiry, cæspitose, frond 1–1½ foot high broad lanceolate subcoriaceo-membranaceous remotely pinnate, pinnæ usually opposite 4–6 pairs sessile

linear-lanceolate elongated acuminated, 3 to 5 or 6 inches long entire at the margin or subsinuato-crenate serrated only at the apex simple (undivided) or here and there with only a single or two horizontal lobes or ears near the base (rarely above the base) at other times the upper pinnæ are sparsely lobed and the lower ones gradually more so, the lowest ones pinnatifid in their lower half with 4–6 oblong-lanceolate lobes on each side spreading horizontally (almost pectinated), veins approximate simple or once forked, veinlets reaching to the margin, sori continuous but not extending to the apex, involucres marginal membranaceous narrow, stipites short in proportion to the length of the fronds and rachises slightly rough to the touch bright tawny glossy. (Tab. CXXVII. B.) Pt. heteromorpha, *Fée, Gen. Fil. p.* 125, 127. Pt. propinqua, *J. Sm. En. Fil. Philipp.; in Hook. Journ. of Bot.* iii. *p.* 405 (*not of Agardh, and name only*).

Hab. Luzon, *Cuming, n.* 409.—This Fern is only known to botanists through Mr. Cuming's specimens from Luzon, and Fée has done well to name it *heteromorpha*. It is very variable, scarcely any two specimens being alike, and yet there is no great variety of form in the pinnules on the same plant: they are either entire or lobed or pinnatifid with from 1 to 10 or 12 segments: and the most numerous segments are on the lower pinnæ. Sometimes upon a specimen pinnæ are seen having only a solitary segment on one side at the base (semihastate). Its affinity is probably with *Pt. crenata;* yet some of our specimens have so many of the pinnæ regularly pinnatifid, that it might almost be referred to the next subsection or group.

18. Pt. (Eupteris) *serrulata*, L. fil.; a foot and a half to 2 feet high, caudex none, root of copious wiry fibres, frond ovate a foot and more long membranaceous pellucid bipinnate, pinnæ opposite, pinnules linear acuminate elongated (especially the terminal ones) sterile portions spinuloso-serrate all decurrent on the rachis so as to represent a bipinnatifid frond, lowermost pinnules sometimes again divided (bipartite) one or two of the lowest pairs often free (not decurrent) fertile ones the narrowest, veinlets simple or forked nearly horizontal, involucres subintramarginal membranaceous rarely reaching to the apex, stipes slender generally shorter than the frond brown-stramineous glossy.—*Linn. fil. Suppl. p.* 425 (*excl. syn.*). *Sw. Syn. Fil. p.* 97. *Willd. Sp. Pl. p.* 373. *Schkh. Fil. t.* 91 (*excellent*). *Ag. Pterid. p.* 13.

Hab. China, on various authorities. Hongkong, *Col. Champion.* *Swartz* adds Ceylon; but I have never seen specimens save from China, and a very young and rather dubious one from Nangasaki, Japan (*Babington in Herb. Nostr.*).—A well-known plant from being long cultivated in our gardens. Most of our copious specimens exhibit a deeply pinnatifid, rather than a pinnated frond, but analogy

with allied species, *Pt. Cretica*, *Pt. umbrosa*, etc., lead to the supposition that the broadly winged rachis is caused by the decurrent and confluent bases of the pinnæ, and the more so as sometimes two or more of the lowest pairs are free, distant, and the rachis not winged between them. The primary pinnæ, whether simple or compound, are rather distant, so that there are not in general more than five to seven pairs; of these sometimes all but the lowest pair are simple (undivided), sometimes all but the uppermost pair are pinnated, and in one case the lowermost pinnule is forked or bipartite. Terminal pinnæ are occasionally 6–8 inches long.

19. Pt. (Eupteris) *luxuriosa*, Kze.; "frond subcoriaceous glabrous short triangular-ovate acuminate curved and flexuose, subtripartite bi-tripinnate more simple above, pinnæ on each side 3–5, inferior ones long, superior ones shortly petiolate, petiole decurrent, lowest very large enlarged downwards (*deorsum auctis*) triangular, all the partial pinnæ or segments from a decurrent base linear-lanceolate sometimes abbreviated sublobate, terminal ones all very long, fertile narrower sterile and denticulate at the apex, sterile pinnules wider unequally dentato-serrate, primary and secondary rachises naked at the base, above winged with the decurrent pinnæ and as well as the short stipes angled flexuose purplish straw-colour, rhizome vertical thickly clothed with scales (? phyllobasis) and roots fusco-paleaceous in the interstices."—*Kze. in Linn.* xxi. *p.* 289 *and* 321.

Hab. Marianne Islands, Manilla (*Kze.*).—"The plant first appeared in the Berlin Garden, and was considered to be a variety of *Pt. serrulata*. 'Hæc vero differt fronde longiore, angustiore, pinnis magis furcatim quam pinnatim divisa, pinnis ensiformibus, infimis magis æqualibus, rhachi stipiteque validioribus, ramis flexuosis, petiolis alatis,'" *Kze. l. c.*

20. Pt. (Eupteris) *melanocaulon*, Fée; "fronds ovoid bitrifid at the base pinnated at the apex, stipes capilliform black smooth shining fragile, mesoneure very black, frondules petiolate very much (*longissime*) arcuate linear in the sterile part crenulate with a very long acumen, lamina sterile towards the apex, indusium broad, sporangia ovoid, annulus broad 18-articulate, spores trigonal smooth pellucid."—*Fée, Gen. Fil. p.* 127, *and* 6*me Mém. p.* 31. *t.* 19. *f.* 1.

Hab. Philippine Islands, *Cuming*.—"A delicate, herbaceous Fern, with the rhizome erect, small. Total length 25–30 centim. Largest frondules 24 centim. long, 4 millim. wide. Stipes erect and almost capillary. Some tickets of Mr. Cuming, by mistake, bear the name of *Tree-fern*. It is quite herbaceous," *Fée*.—This is quite unknown to me.*

* Since the above was in type, the figure of M. Fée has appeared, and from this it would appear that it is one of the many forms of *Pt. Cretica*, or the very dubious *Pt. scabripes*, Wall.: this latter has generally a black stipes and costa.

21. Pt. (Eupteris) *distans*, J. Sm.; 1½–2 feet high, caudex none, roots tufted fibrous, frond a foot or more long submembranaceous lanceolate pinnate, superior pinnæ numerous linear-oblong subfalcate approximate and most of them confluent at the base spinuloso-serrated at the apex, the rest of the pinnæ again pinnated very distant, pinnules linear-oblong approximate and often confluent at the base, terminal pinnule very long linear caudate spinuloso-serrate, veinlets forked, involucres slightly intramarginal membranaceous not reaching to the apex of the pinnules close-pressed, stipes short and rachis tawny or brown scabrous. (TAB. CXXIV. B.)—*J. Smith in Hook. Journ. of Bot.* iii. *p.* 405 (*name only*).

Hab. Luzon, *Cuming*, *n.* 410.—A very remarkable, and assuredly quite distinct, species; nor have we seen any specimens which show much affinity to any known species: the several samples we have seen of Mr. Cuming are uniformly the same. Perhaps instead of considering the frond as bipinnate, it would be more correct to describe it as pinnate, with the pinnæ deeply pinnatifid (pectinatedly so); thus, what we have called the numerous, closely-placed, and at the base confluent, pinnules, would be the lobes or segments of long pinnatifid pinna, with its terminal lobe narrow-caudate, and the inferior pinnated pinnæ would in like manner be pinnatifid pinnæ, with few segments, and with the terminal lobe elongated, but in some of our specimens these segments are quite free and independent of the rest, and in themselves true pinnules.

22. Pt. (Eupteris) *semipinnata*, L.; 1–3 feet high, caudex stout creeping villoso-squamose fibrous-rooted, fronds broad-lanceolate acuminate submembranaceous pellucid pinnate, superior pinnæ approximate linear-oblong sessile at the base adnate and decurrenti-confluent, lateral ones distant subpetiolate semi-ovate, superior margin entire, inferior subpectinato-pinnatifid (lowest pair sometimes bipartite) the extremity long-caudate, the segments oblong all spinuloso-serrated in the sterile fronds, linear and entire except at the apex in the fertile ones, veins simple and forked, involucres subintramarginal membranaceous often continued round the apex, stipes rather stout castaneous or purple-ebeneous very glossy.—*Linn. Sp. Pl. p.* 1534. *Swartz, Syn. Fil. p.* 97. *Willd. Sp. Pl. p.* 388. *Ag. Pterid. p.* 17. Pt. flabellata, *Schkh. Fil. t.* 93 (*not Th.*). Pt. alata, *Lam.* (*not Gaud.*). Pt. dimidiata, *Blume, Fil. Jav. p.* 210 (*not Willd.*). *Osb. It. Chin. t.* 3. *f.* 1.—*β.* superior lateral pinnæ pectinato-pinnatifid on both sides, segments of the upper side abbreviated and gradually reduced to the lowest pinnæ where they are only auricled at the base above.

Hab. India: Tranquebar, Sylhet, *Wallich*, and Khasia, elev. 3–4000 feet, *Thom-*

son and Hooker. Ceylon, *Mrs. Gen. Walker.* Assam, *Jenkins, Simons.* Luzon, *Cuming, n.* 258. Borneo, *Mr. Barber.* China, *Osbeck and others:* Macao, *Vachell;* Koo-lung-Loo Island, *Alexander.* Japan, *Miss Nelson.*—*β.* Nangasaki, Japan, *Mr. Babington.*—An extremely distinct and well-marked species, of which however our var. *β* is a very remarkable variety.

23. Pt. (Eupteris) *Dalhousiæ,* Hook.; tall 2–3 feet and more high, frond ample 1–2 feet subcoriaceo-membranaceous glossy bi- tri- below subquadripinnate, pinnæ and pinnules all remote, superior pinnæ simple (undivided) and pinnules all linear-sublanceolate very much elongated acuminated and serrated remarkably alato-decurrent on the rachis, lower primary pinnæ not decurrent petiolate falcate (lowest pair sometimes bipartite) the upper margin entire (rarely with one segment) the lower pinnate (or pinnatifid) with 5 or 6 (more or less) long pinnæ decurrent so as to form a very broad winged rachis, veinlets simple or forked, involucres subintramarginal narrow membranaceous continuous along the rachis rarely reaching the acuminated apices, stipes very glossy and as well as the firm prominent costa bright glossy tawny or purple-brown. (Tab. CXXI. A.)

Hab. Penang, *Lady Dalhousie.* Java, *Thomas Lobb, n.* 206.—It is impossible to do justice to this large and beautiful species in the small space allotted to our figures. It is evidently allied to *Pt. semipinnata,* L., having the majority of the pinnæ again pinnated, or, if the term is preferred, pinnatifid only on the lower side; but is at once distinguished from that by its great size, by the very remote superior pinnæ, and by the great length of all the segments. In one of our specimens the lowest pinnæ are bipartite, and each segment represents as it were a frond in its structure, the apex having the simple pinnæ on both sides, and the lower pinnæ being unilaterally divided. Mr. J. Smith has marked the specimen in his herbarium, from Java, as *Pt. venulosa,* Bl.; but whatever uncertainty there may be about that species, it cannot be our present one, for Blume and Agardh could not have overlooked the peculiar division of the pinnæ, so much like that of *Pt. semipinnata.*

24. Pt. (Eupteris) *Griffithii,* Hook.; a foot and more high and slender graceful, caudex none, roots of tufted fibres, frond ovato-lanceolate submembranaceous pinnate, upper pinnæ simple 2 or 3 of the lower pairs again pinnated simple, pinnæ and pinnules exactly linear ½ an inch to an inch and a half long obtuse mostly opposite everywhere entire sessile with the base adnate and decurrent so as to form a narrow wing to the rachis, lowest pinnules of the inferior pinnæ sometimes again divided, terminal pinnule always elongated, veins distant once forked, veinlets divaricating, sori continuous, involucres subintramarginal membranaceous not reaching to the apex, stipites slender longer than the fronds stra-

mineous-brown and a little scaly at the base. (TAB. CXXIII. A.)

Hab. East Indies: Mishmee, *Griffith.*—I have never seen this in any collections but those of the late Mr. Griffith from Mishmee. The several specimens are extremely uniform in their character, only varying a little in size, and in the greater or less number of compound pinnæ at the base of the frond, from one to three pairs; and I can refer to no known species with which it can be confounded.

*** *Fronds variously divided, rarely once pinnate with the pinnæ pinnatifid; more frequently* 2- 3- *or* 4-*pinnate, especially below.*—This section includes a heterogeneous group, which it is impossible to separate and characterize, so varied is the ramification even in one and the same species.

25. Pt. (Eupteris) *Madagascarica*, Ag.; frond bipinnate, pinnules distant on rather long petioles linear-lanceolate narrow acuminate serrated at the sterile apex, inferior ones (on the branch) subpinnate, pinnules few 1–3 short, veins stout (for the size of the pinnules) forked, veinlets spreading, involucres subintramarginal very narrow membranaceous, rachis slender subflexuose scabrous beneath. (TAB. CXXII. A.)—*Ag. Pterid. p.* 17.

Hab. Madagascar, *Bojer, in Herb. Nostr.*—Agardh describes this as the third species of a singular form of *Pteris;* the two others being *Pt. laurea* and *Pt.* (Litobrochia) *triphylla;* peculiar to Madagascar, more compound than they, subtripinnate. Pinnæ elongated, nearly a foot long; petioles nearly 3 lines long. The pinnules have a tendency to the ternary division, also characteristic of the two just mentioned, but eventually to become pinnate. The form of the pinnules themselves is also different, elongato-lanceolate, much attenuated and lengthened at the apex, and there coarsely serrated. The veins are all forked, their branches patent. Rachis (and also the stipes?) very scabrous beneath. The branch of this may be from a very compound Fern, and the rachis seems to have a disposition to be scandent and the pinnæ to be refracted. It is a very peculiar species, as may be seen from our figure.

26. Pt. (Eupteris) *triphylla*, Ag.; frond (a solitary and sterile specimen) 1½ foot long oval membranaceous glossy bi-subtripinnate, all the pinnæ long-petiolate, superior ones and secondary pinnæ mostly triphyllous rarely pentaphyllous, pinnules oblong terminal ones very much elongated (2–5 inches long) all obtuse subcrenate a little serrate towards the apex, veins forked once or twice or more on one and the same pinnule both free and united by arched (or angulato-arched veins) next the midrib (as in *Campteria*, Ag.), rachises slender smooth tawny. (TAB. CXXXI. B.)—*Ag. Pterid. p.* 16.

Hab. Madagascar, *Dr. Lyall* (in Herb. Nostr.).—Professor Agardh's description (*l. c.*) from our specimen is very faithful. "The frond is probably large, a foot and a half long. Rachis brown, very smooth, with about eight pairs of pinnæ. All the pinnæ petiolate, petioles an inch long, at length pinnated, pinnules

nearly all triphyllous and petiolate. Folioles of the pinnules linear, 2 inches long, rather less than ⅛ an inch broad, slightly crenulated, obtuse; lateral ones shorter, sessile."—Our specimen unfortunately possesses neither stipes, nor caudex, nor fructification, and I should hardly have deemed it worthy of a figure, distinct as it no doubt is as a species, but for the sake of showing the venation which, on one and the same pinnule (and common to most of the pinnules), exhibiting one-half the veins united by arched (or angularly-arched) veins adjacent to the midrib, while the rest are free, thus, as it were, uniting in one and the same specimen, the supposed generic characters of *Campteria* (itself a passage to *Litobrochia*) and true *Pteris*. As a species this is remarkable for the pinnæ, in themselves not unlike those of *Pt. crenata*, being all long-petioled.

27. Pt. (Eupteris) *semidentata*, Fée; 1½ foot high, frond more than a span long ovato-deltoid acuminate submembranaceous but firm tripinnate, pinnules patent distant ½–¾ of an inch long narrow-oblong subfalcate opposite or nearly so more or less decurrent, apex (or sterile portion) coarsely serrated, serratures muticous, terminal pinnules caudate acuminate serrated, sori subintramarginal not extending to the base nor apex, involucre membranaceous even close-pressed, veins obscure not prominent simple or forked (never anastomosing), stipes brown at the rather thickened base, the root and the slender rachises (winged by the decurrent pinnules) stramineous very slender. (Tab. CXXVIII. B.)—Pteris semidentata, *Fée, 6me Mém. p.* 32. *t.* 18. *f.* 3.

Hab. Province of Ocaña, N. Granada, Paramos, elev. 8–10,000 feet, *Schlim, n.* 482.—This I cannot but consider a new species, though evidently allied to our next species, *Pteris gracilis*, and, like it, it has not the anastomosing veins of *Litobrochia*. It is a larger-growing plant, is less compound, with larger, broader, more obtuse, more patent, more apart, subfalcate, and less decurrent pinnules, with fewer and smaller serratures, always muticous: the texture is less pellucid, the veining seen with more difficulty. I have only a solitary specimen, of which our figure represents one of the lowest primary pinnæ.*

28. Pt. (Eupteris) *gracilis*, Fée; about a foot high, caudex a mere scaly knot throwing out many wiry fibres, frond 6 inches to a span long subpedately deltoid acuminate thin membranaceous pellucid tri- below subquadripinnate, pinnules copious crowded ½ an inch long less than a line wide opposite or alternate linear acute tapering and the upper ones especially very decurrent at the base pinnatifidly serrated (except the soriferous portions), serratures setiferous, terminal pinnæ caudate, sori subintramarginal not extending

* Since this sheet was in type, M. Fée has published figures of this species (which we had called *Pt. Schlimii*), and of the following, and we are glad to have the opportunity of changing the name of the present species to the older one of *Pt. semidentata*.

to the base nor to the apex, involucre membranaceous close-pressed entire, veins all simply pinnated elevated, veinlets simple rarely forked each terminating in the seta, stipes and very slender and mostly winged rachises fulvous-brown glossy naked. (TAB. CXXVIII. A.)—Pteris gracilis, *Fée, Gen. Fil. p.* 128 (*not Michaux, v. supra, p.* 138). *An* Pteris spinulosa, *Raddi, Fil. Bras. t.* "70 *bis*," *not* "70"?

Hab. Brazil, *Clausen* (*Fée*): Rio, *Forbes*. S. Brazil, *Tweedie*.—I have long known this in my herbarium, and considered it as a new species of *Pteris*, although marked by the learned Agardh as *Pteris* (Litobrochia) *leptophylla*, Sw. (*Pt. spinulosa*, Raddi). Certainly, except in the rather smaller size of the pinnules, it seems to be identical with the second figure of Raddi's *Pt. spinulosa* (tab. "70 bis," not tab. "70"); and, as M. Fée justly remarks of his *Pt. gracilis*, "*Litobrochiæ leptophyllæ* affinis, nervillis vero liberis, fronde magis dissecta, segmentis angustioribus, dentibus apice setaceis" (so they are also in *spinulosa*). The *veins* are indeed *all free*. Still I am not sure that this character, albeit considered generic, will justify the separation even specifically. In all the very narrowed segments of true *Pt. leptophylla* or *spinulosa*, the veinlets are free, and in proportion as they are broader and more widely decurrent, they anastomose. More copious specimens, should we be so fortunate as to procure them, can only settle the question satisfactorily. *Pteris gracilis*, of Michaux, being now universally referred either to *Allosorus* or *Pellæa*, Nob., sets that name free to be here retained.

29. Pt: (Eupteris) *irregularis*, Kaulf.; 2–4 feet high, caudex?, frond 1–2 feet and more long ample ovate submembranaceous tri–subquadripinnate, pinnæ alternate all of them except the lower primary pinnæ which are petiolate decurrent so as to form a very broad wing on all the rachises, wings of the main rachis contracted where they join the next pinna below so as to form a repand margin, ultimate pinna oblong-lanceolate a little falcate sometimes linear-lanceolate and much acuminate, the sterile apices slightly serrated, all the margins soriferous, the sori extending generally even to the apices, involucres narrow submarginal membranaceous, veinlets mostly forked, stipes nearly as thick as one's little finger triangular castaneous chaffy with subulate scales at the base, rachises and costa stout prominent beneath glossy and brown.—*Kaulf. Enum. Fil. p.* 189. *Ag. Pterid. p.* 18. Pt. alata, *Gaud. in Freyc. Voy. Bot. p.* 391. *t.* 19 (*excellent*). *Hook. et Arn. in Bot. of Beech. Voy. p.* 107. Pt. elongata, *Nutt. MSS.* (*var. with long tapering pinnules*).

Hab. Sandwich Isles, and apparently confined to that group of islands. Our specimens are all derived from Oahu, *Chamisso, Gaudichaud, Douglas, n.* 31, *Beechey, Nuttall, Seemann, n.* 2238, *Brackenridge*.—One of the most distinct and remarkable of the genus, resembling a multipinnatifid leaf of some coarse umbelliferous plant, varying much in the length and in the breadth of the pinnæ, and in the leafy or winged rachises, whence probably Kaulfuss's name of *irregu-*

laris, though we confess we should have preferred the name given two years later by Gaudichaud of *alata*; the costa is peculiarly stout and prominent, and generally of a rich chestnut colour, as is the very thick triangular stipes, which is chaffy with narrow subulate scales at the base. The root or caudex I have not seen.

30. Pt. (Eupteris) *scaberula*, A. Rich.; a foot and a half to 2 feet and more high, caudex very long creeping here and there rooting thicker than a crow's quill brown glossy but rough and partially paleaceo-hirsute, frond more or less erect ovate or broad-lanceolate rigid coriaceous everywhere resinoso-glandulose and subpubescent tri- rarely subquadripinnate, primary pinnæ varying much in length and outline lowest pair of them always very distant from those above them, secondary pinnæ lanceolate acuminate, ultimate pinnules very small a line more or less long serrated and towards the lower part of the secondary pinnæ pinnatifid, veins indistinct simple, involucres formed by the revolute membranaceous margin which is soon forced back by the spreading of the sori, stipes 4 to 8 or 10 inches long and as well as the flexuose main rachis rich tawny-brown rough with resinous points. (Tab. XCIII. A.)—*A. Rich. in Voy. de l'Astrol.* i. *p.* 82. *t.* 11. *A. Cunn. Bot. N. Zeal. in Hook. Comp. Bot. Mag.* ii. *p.* 365 (*et* Pt. microphylla, *p.* 366). *Hook. fil. Fl. N. Zeal.* ii. *p.* 25. Allosorus, *Presl.*

Hab. New Zealand: Northern and Middle Islands, as far south as Akaroa, frequent, *Allan Cunningham, D'Urville, Bidwill, Sinclair, Colenso, J. D. Hooker, Lyall, Raoul.*—One of the most elegant of Ferns, and most distinct. Indeed it is difficult to mention any species with which it has a close affinity. In its very creeping root, and coriaceous texture, and somewhat in its ramification, it seems allied to the *Aquilina*-group, but the frond is very much and very minutely divided. The stipes and flexuose main rachis are of a rich tawny hue, rough to the touch. I possess specimens varying from a span almost to 3 feet in height. The primary pinnæ vary extremely in length, and somewhat in the compactness or closeness of the pinnules; and the lowermost pair of primary pinnæ I almost invariably find to be wide apart from the pair above.

31. Pt. (Eupteris) *tremula*, Br.; frond 2–3 and more feet long ovate or oblong submembranaceous 3–4-pinnate to decompoundly pinnate, pinnæ broad-lanceolate, superior pinnules simple linear or linear-oblong, sterile portions usually serrated their bases decurrent and confluent, lower pinnules with a broad base gradually acuminated crenated or again pinnate or pinnatifid with many linear-oblong obtuse segments, narrower and often quite linear in the fertile specimens, veins forked, the veinlets divaricating, involucres subintramarginal often continuous round all the segments and to the very apex of the pinnule of a greenish-brown colour

entire at the edge, capsules frequently orange-colour, stipes and primary rachis rich chestnut-coloured glossy, secondary and tertiary rachises more or less winged with the decurrent pinnules. (Tab. CXX. B.)—*Brown, Prodr. Nov. Holl. p.* 154. *Ag. Pterid. p.* 40. *Hook. fil. Fl. N. Zeal.* ii. *p.* 25. Pteris affinis, *Rich. in Bot. of the Astrolabe, p.* 81. *A. Cunn. in Hook. Comp. Bot. Mag.* ii. *p.* 365. Pt. chrysocarpa, *Link, Hort. Berol. p.* 33. Pt. tenuis, *A. Cunn. l. c. p.* 365.

Hab. New Holland: Port Jackson, *Brown, Sieber, etc.;* Victoria, *Robertson.* Port Stephens, *Capt. King* (with very narrow, firm, linear segments). Tasmania, *R. Gunn, n.* 1538, and *n.* 41 (with the ultimate simple pinnules an inch and more long, firm and crenato-lobate, capsules very copious and bright-orange). Norfolk Island, *Dr. V. Thomson.* New Zealand: Auckland, *Sinclair;* Bay of Islands, *Dr. Hooker* (some specimens very finely cut); Hutt Valley, *Dr. Lyall;* Wangaroa, *Allan Cunningham.* Lord Howe Island, *Macgillivray, n.* 699, *Milne, n.* 27.—Dr. Hooker speaks of this as a species of Juan Fernandez and Chili, but that plant is the *Pt. Chilensis* of authors; and he further remarks that *Pt. tremula* so closely resembles *Pt. aryuta* of the south of Europe, etc., that he thinks it possible that all may prove to be one widely-diffused species. Although I am not prepared to subscribe to the latter opinion, I am quite unable to point out in words, still less in a diminutive figure, the marks by which this may be distinguished with certainty from the following (*Pt. Chilensis*). Indeed each of these two species (if they be such) are so variable in themselves, that they present forms quite distinct from what may be considered their normal states. Mr. Cunningham describes it under two different names in his 'Prodromus of the New Zealand Flora,' and in neither did he recognize the *Pt. tremula* of Mr. Brown, which he must have been familiar with as an Australian species. The most uniform marks of our present plant (*Pt. tremula*), as distinguishing it from *Pt. Chilensis*, may perhaps be found in the larger size, more elongated outline or circumscription of the frond, more compound, with the segments broader and longer in some cases, in others longer and narrower; when a pinnule is pinnatifid, the segments are generally more numerous, the involucre is more continuous, less thin and membranous, of an olive-green colour, entire at the margin; the capsules are very copious, and generally of a golden colour. Still, most of these are but relative characters, or, as in the case of the involucres, too minute to be surely depended upon. *Pt. aryuta* is always a much larger and stouter plant, with broader segments and short sori, never reaching to the apex, and rarely more than half the length of the segment. *Pt. Chilensis*, like it, is sometimes sporuliferous at the base of the lobes. In our figures of the two species (at Tab. CXX. A. and B.) we have endeavoured to represent such a portion of each as shall best explain our meaning. Some of the specimens with more rigid fronds approach the *Aquilina*-group.

32. Pt. (Eupteris) *Chilensis*, Desv.; 1½–3 feet high, caudex short thick and repent, frond deltoid membranaceous tender 3–4-pinnate, ultimate pinnæ or pinnules about ½ an inch to an inch long ovato-lanceolate sessile more or less decurrent at the base, terminal ones confluent all undivided or pinnatifid below with 2–5 oblong rather obtuse lobes, sterile ones broader, fertile ones sometimes linear serrated at the apex, veins lax, veinlets forked, involucres subintramarginal con-

tinuous sometimes reaching to the apex of the pinnules white thin membranaceous slightly crenate and fimbriate at the margin, stipes about a foot long and main rachises straminеous or brown glossy, secondary rachis slightly winged with the decurrent bases of the pinnules. (Tab. CXX. A.)—*Desv. Berl. Mag. Nat. Hist.* 1811, *p.* 325. *Hook. et Arn. Bot. of Beech. Voy. p.* 53. *Kze. in Linnæa*, ix. *p.* 76. *Ag. Pterid. p.* 41. Pt. tenera, *Kaulf. Enum. p.* 191. *Colla, Plant. Rar. Bert.* iv. *p.* 76. *Gay, Fl. Chil.* vi. *p.* 56.

Hab. Chili, *Pœppig, Beechey, Gay:* Andes, *Cuming, n.* 634; Valparaiso, *Cuming, n.* 634, and Conception, *n.* 148. Juan Fernandez, *Bertero, n,* 1558 (*in Herb. Nostr.*), *Cuming, n.* 1330, *Douglas, n.* 12. Agardh gives Peru, *Dombey,* probably on the authority of the Paris Herbarium, but I have never seen it from that country. (See remarks on this species under our preceding one.)

33. Pt. (Eupteris) *laciniata*, Willd.; everywhere more or less hirsute, frond ample 4–4½ feet long tender herbaceo-membranaceous (brown when dry) bipinnate ultimate pinnæ or pinnules pinnatifid, primary secondary or ultimate ones confluent and decurrent lanceolate acuminate pinnatifid, lobes varying in length and breadth more or less ovate or oblong obtuse everywhere entire, veins branched, zigzag veinlets few distant forked all arising from the main veinlet distant from the costa, sori short in general, involucres marginal never reaching to the sinuses nor to the apex of the lobes nor to the acuminated apices of the pinnæ, stipes (stout) and rachises ferruginous hairy or somewhat scaly. (Tab. CXXXII. B.)—*Willd. Sp. Pl. p.* 397. *Schkuhr, Fil. t.* 86 (*not t.* 2). *Liebm. Fil. Mex. (in part), p.* 75. Lonchitis hirsuta, *Linn. Sp. Pl. p.* 1536. *Willd. (in part).* Pteris villosa, *Sw. Syn. Fil. pp.* 100 *and* 295? Filix villosa, pinnulis quercinis, etc., *Plum. Fil. p.* 16. *t.* 20.

Hab. Mexico, Mirador, on mountains from 600 to 3000 feet of elevation, *Liebmann, Linden, n.* 31. Chirambira, *Seemann.* Venezuela, colony of Tovar, *Fendler.* West Indian Islands: Martinique, *Plumier;* St. Vincent, *Guilding;* Jamaica, Bath, near the hot-well, *Dr. Alexander;* Guadaloupe, *L'Herminier;* Dominica, *Dr. Imray.*—This has the general aspect of *Lonchitis*, and is indeed the *Lonchitis hirsuta*, Linn., and of Schkuhr and Willdenow in part (where they refer to the *West Indian* plant). If we could trust implicitly to the accuracy of Plumier's plate, it would be a *Lonchitis*, with free, not anastomosing veins; but our plant exhibits the fructification of a *Pteris*, as the figure will show. It has been confounded with Willdenow's *Lonchitis pubescens*, which is exclusively a plant of Mauritius and Bourbon, with reticulated venation and short sori in the sinuses of the lobes of the pinnules. M. Fée has a *Pt. flaccida* ("Lonchitis, *Bory, Herb.*") which he places near to *Pt. laciniata*, as the only species of his section "*Lonchitidium*," among *Pteris;* but if it be distinct from *Pt. laciniata*, I know nothing of it, and it appears to be nowhere described.

The affinity of this among the species of *Pteris* is very doubtful: the nature

and ramification of the frond, the villous surface, the short sori, are quite peculiar. It has no spinules at the base of the lobes.

It is remarkable that so common a species as this evidently is should not have found a place in Agardh's 'Recensio Specierum Generis Pteridis.' He probably considered it a *Lonchitis;* and it is, we presume, the *Lonchitis hirsuta*, L., of Grisebach's 'Plantæ Caribeæ.'

34. Pt. (Eupteris) *marattiæfolia*, Hook.; frond (a portion probably only under examination) broad-ovate acuminate submembranaceous firm glabrous pale green bipinnate, primary pinnæ petiolate ovato-lanceolate, secondary or pinnules moderately distant 2–3 inches and more long less than half an inch broad lanceolate sharply acuminate and serrated especially at the apex sessile the base obliquely cuneate and decurrent so as to form a very narrow wing on the rachis but not extending to the pinnules beneath except in the superior ones, terminal leaflet longer and more acuminate than the rest, lowest pinnule of the inferior pinnæ with a lobe or auricle on the upper base, veins conspicuous slightly elevated on the under side forked free, involucre narrow formed of the dilated margin of the pinnule membranaceous in interrupted lines and scarcely continued beyond the middle or lower half of the pinnule, stipes (?) and rachis stramineous glossy. (Tab. CXXII. B.)

Hab. Chiloe, *Capt. Philip King, R.N.*—A most distinct and well-marked species, of which the only specimens I have ever seen are those given me by Capt. King, and Mr. J. Smith's specimens derived from the same source. The name *marattiæfolia* is expressive of the nature of the pinnules of this plant, which are moreover conspicuously veined very much in the same manner as in that genus. The sori sometimes continue uninterrupted for nearly two-thirds the length of the pinnule, but they are more frequently broken into short lines. It is probable that better specimens will exhibit a more compound nature, for, in our incomplete one, the lowest pinnules have an auricle or lobe at the superior base, indicating a disposition to further division. All the veinlets are clavate and pellucid at the apex, and do not attain quite to the margin.

(*Fronds pinnate; pinnæ deeply pinnatifid, all uniform, not again pinnated.*)

35. Pt. (Eupteris) *patens*, Hook.; frond ample erect strict membranaceous dark- (when dry blackish-) green pinnate, pinnæ alternate very long (8–12 inches) strict horizontally patent numerous approximate elongato-oblong acuminate rarely subcaudate sessile or lower ones shortly petiolate deeply pinnatifid almost to the very rachis, segments horizontal very uniform linear scarcely acuminate obtuse often opposite sterile ones serrulate the base dilated decurrenti-confluent on both sides especially at the lower base sometimes apart, veins all free simple or once or twice forked,

sori continuous almost to the apex, stipes and rachis stout erect strict purplish-chestnut colour. (Tab. CXXXVII.)—Pt. excelsa, var., *J. Sm. Herb.* Pt. decussata, *J. Sm. in Hook. Journ. of Bot.* iii. *p.* 405 (*name only*).

Hab. Ceylon, *Mrs. Gen. Walker, Gardner, n.* 1126. Luzon, *Cuming, n.* 103. Society Islands, *Bidwill.*—Nowhere can I find this fine species described, and yet it appears to be a well-marked and very distinct kind. It is undoubtedly the plant n. 103 of Mr. Cuming's Luzon collections, and hence is the *Pt. decussata* of Mr. J. Smith, in Hook. Journ. of Bot. l. c., but no character or observations are offered, and in his own herbarium Mr. Smith refers his species to *Pt. excelsa*, Gaud., of which he considers it a variety; he does so in the belief that the lowest pair of pinnæ are forked or divided, though neither his own specimens nor my more numerous ones in their lower pinnæ exhibit any such character; but even should it be so, I believe there are sufficient differences to warrant its being considered a new species, and this will be at once seen by our respective figures (Tab. CXXXVI. and Tab. CXXXVII.). The very strict habit of the main and secondary rachises, the horizontally patent, uniform, narrow segments, are quite unlike what we see in *Pt. excelsa.*

36. Pt. (Eupteris) *litobrochioides*, Kl.; "frond pinnate, pinnæ 3–4 pairs very large much acuminated (long caudate) attenuated and decurrent at the base pinnato-partite (rather deeply pinnatifid), segments lanceolate falcate acute serrated, sinuses rather obtuse, veins forked, stipes and rachis glabrous yellowish-brown grooved above."—*Kl. in Linnæa*, xx. *p.* 341.

Hab. British Guiana, *Richard Schomburgk.* Cataracts of the Aripecurú, prov. Pará, n. 1137, Amazon, *R. Spruce, n.* 561, larger, darker green and less falcate segment.—An authentic specimen of this, with apparently a perfect frond, is about a foot and a half long, the texture subcoriaceous, colour pale green, caudex very long, finely acuminated, stipes and rachis very glossy and smooth. Our plant from the Amazon appears to be a perfect frond, about 2 feet long, pinnæ longer, all dark-green and uniform, the main rachis is stout, not glossy, and a little muricated; neither of these has the lower pinnæ bipartite, or I should have referred them to the next subsection. It has indeed a very close affinity with the East Indian *Pt. longipinnula*, Wall.

(*Fronds pinnate, pinnæ pinnatifid, lowest pair or more bipartite or again once or more pinnate, the costa above spinulose at the base of a segment.*—In the more compound forms the primary division is ternate, and the inferior or lateral divisions are more compound than the terminal one, and the lower side bears longer pinnæ than the upper side.

Obs. This section, or subdivision, is destined to include a series of species (or varieties) more or less connected with each other, respecting whose limits no two botanists are agreed. These supposed species too are not confined to any particular country, but widely dispersed through tropical regions in the Old and in the New World. The type of this group, if I may so call it, by which I mean one which has held a place in all works on Ferns since the days of Retz and Willdenow, is the *Pt. quadriaurita* (often by a *lapsus calami* written *quadrialata*), but this has been confounded with *Pt. nemoralis*, and sometimes with *Pt. biaurita*, L., three plants with entirely the same habit and general form, but each having its peculiar venation. The difficulty too of determining the species of authors is greatly increased by there being few or no characteristic figures for reference

nor could justice be done to such figures except they were executed on a large scale.—If the Author of the present work has few or no authentic specimens or figures to refer to for the original species, he is fortunate in having the advantage of possessing in his herbarium authentic specimens of the majority of those described by Agardh in his well-known 'Recensio Specierum Generis Pteridis,' and which are of no small value on the present occasion.)

37. Pt. (Eupteris) *longipinnula*, Wall.; tall, frond ample oblong-ovate coriaceo-submembranaceous shining, pinnæ large (often a span long) broad lanceolate pectinato-pinnatifid rarely bipartite, segments spreading nearly horizontally linear-oblong subacute entire, terminal one more or less elongated, lowest pair unequal short decurrent into a short petiole, involucres very narrow extending from the sinus nearly to the apex, veins prominent forked from their base, stipes elongated (2–3 feet long) and as well as the rachis and costa usually of the same colour as the frond (rarely brown) glossy. (Tab. CXXXIV. A.)—*Wall. Cat. n.* 108. *Ag. Sp. Pterid. p.* 19.

Hab. Mountains of Penang, *Wallich;* Labuan (with only five pinnæ), *Thos. Lobb;* Bhotan, *Griffith;* Nepal, Sikkim, 2–4000 feet, *Dr. Hooker;* Assam, *Simons;* Khasia, 2–3000 feet, and Sylhet, *Drs. Hooker and Thomson;* Cotalam, Madras, *G. Thomson, n.* 139, *in part.*—A large species, several feet high, including the stipes, the pinnæ having very much the general appearance of those of the next group, but here the pinnæ are generally all uniform, that is, the lowest pair not again divided, and this is the case with all our numerous specimens save one, where a forking takes place. The species too is remarkable for the short, lower, unequal and decurrent segments of the pinnæ, and the generally green colour of the stipes, rachises, and costæ; and for the conspicuous venation, the veins rather distant and forked to the base. Agardh, under *Pt. longipinnula*, in a note, makes allusion to the *Pt. attenuata*, Sw. (not Blume), and of which a segment of a pinna is figured by Presl in his Tent. Pteridograph. t. 5. f. 18. The latter author says of it, "*Pt. argutæ* affinis, sed pinnæ infimæ non partitæ sed indivisæ." But all is doubtful about that plant, and the two authors had probably different species in view.

38. Pt. (Eupteris) *quadriaurita*, Retz; caudex short erect, fronds often large ovato- or cordato-ovate acuminate coriaceo-membranaceous pinnate, pinnæ 5–21 or more mostly opposite sessile lanceolate deeply pinnatifid (so as to leave a narrow wing to the rachis), segments oblong obtuse mostly entire, terminal ones caudate, lowest pair of pinnæ (sometimes more) bipartite or rarely bearing 2 or 3 pinnæ on the lower side, lowest segments subdecurrent on a short petiole, veins forked basal ones terminating at or above the sinus, involucres occupying nearly the whole length of the margin of the segments, stipes elongated stramineous or brown smooth and glossy or scabrous. (Tab. CXXXIV. B.)—*Retz,*

Obs. vi. *p.* 38. *Willd. Sp. Pl. p.* 385. *Ag. Sp. Gen. Pterid. p.* 24. Pt. nemoralis, *Hook. Gen. Fil. t.* 54 *a.* Pt. biaurita, var., *Sw. Syn. Fil. p.* 98. Pt. calcarata, *Bory in Bel. Voy. p.* 42 *(fide Ag.).*

Hab. Ceylon and East Indies ("v. sp. in *Herb. Retz*," *Agardh*). But of this protean and wide-spread species we shall do best, perhaps, to notice the variations, and such synonyms as we can authenticate, under the following localities:—

ORIENTAL.—Ceylon, *Gardner, Mrs. Gen. Walker, Dr. Maxwell*, varying much (as in other countries) in size of frond, and number of pinnæ, and in the nature of the apex of these pinnæ; sometimes the segments gradually form a serrated acute point, sometimes the terminal one is singularly elongated, 2–4 inches, forming a long cauda. Dr. Maxwell's specimens are proliferous from the veins on the under side of several of the segments in a very remarkable manner; or can these productions be parasites? These do not appear to become frondose or even herbaceous, but are tufted and branched so as, in the herbarium, very much to resemble in size and appearance dried specimens of the well-known Alga, *Laurencia obtusa*, but of a dark-brown colour. From Ceylon we have received, both from *Gardner, n.* 1133, and from *Mrs. Gen. Walker*, a remarkable abnormal state of this species, having only the middle of the pinnæ pinnatifid, and this in a very irregular and unequal manner, the segments becoming confluent into a tail-like point, and below confluent and more or less decurrent to the base. Madras Peninsula, *Dr. Wight, n.* 87, 4–5 feet high, the pinnæ with tail-like points 4 inches long: Cochin, *Rev. E. Johnson*, with long, very acuminated points; Cotalam, *G. Thomson, n.* 140 *b*; Concan, *Mr. Law*; Nilghiri, *Mac Ivor, n.* 22, *G. Thomson, n.* 140 *b.* Punjaub, Rajaori Mountains (stipes red, subscabrous), *Jacquemont, n.* 1272. Scinde, *Dr. Stocks*, frond subpellucid. Nepal, stipes reddish and scabrous (Pt. aspericaulis, *Wall. Cat. n.* 107; *Ag. Sp. Gen. Fil. p.* 22. Pt. pectinata, *Don, Prodr. p.* 15). Simla, *Col. Bates, Dr. Thomson, n.* 143 *a.* Kumaon, *Strachey and Winterbottom, n.* 6, 7000 feet elev., numerous close-placed pinnæ. Sikkim, 3–11,000 feet, *Drs. Hooker and Thomson, n.* 143 *b*, 146, and 143 *c*, stipes very rough; Rating valley, *Dr. Hooker, n.* 143 *b*, spinules copious, even on the costa of the segments, *n.* 139 *c.* Bhotan, *Griffith, n.* 2813, stipes very rough. Gowhatty, Assam, *Mr. Simons*, with caudiform points, 2–4 inches long, slightly serrated, and from the Miku hills, with the same proliferous character as noticed under Ceylon specimens. Chittagong, very spinulose, even on the costa of the rather long (inch and a half) narrow segments of the pinnæ, *Drs. Hooker and Thomson.* Malay Islands, Luzon, *Cuming, n.* 79, large, pinnæ numerous, Pt. spinescens, *Presl, Reliq. Hænk., according to J. Sm.; Ag. Sp. Gen. Pterid. p.* 30, *note.* Luzon, *Cuming, n.* 69, pinnæ 7, remote, cauda equal in length to the pinnæ, upper part of stipes and principal rachis ebeneous. *J. Smith, in Hook. Journ. Bot.* iii. *p.* 405, names this *Pt. Presliana*, Ag. (but I find no such species described), and *Pt. attenuata*, Pr. (not Sw.), and this last is a very dubious species. *Cuming, n.* "24," Luzon, in my Herb., common form. Java, *Mr. Millet*, nearly allied to the last-mentioned, but pinnæ more numerous, and cauda shorter in proportion, and Penang, *Dr. Wallich, n.* 106; both these are *Pt. Blumeana*, Ag. Sp. Gen. Pterid. p. 22, and, according to the same author, "*Pt. nemoralis*, Bl. En. Fil. Jav. p. 211; *Pt. hamulosa* and *nemoralis* (in part), Wall., and *Pt. scabra*, Gaud.?" Borneo, *Mr. Barber, n.* 322, small, scarcely a foot high, including the stipes; that and the rachises are very black and glossy. Singapore, *Sir W. Norris*, pinnæ remote, segments narrow. Penang, *Wallich. Pt. nemoralis*, Wall. Cat. n. 106/2, also *Pt. pyrophylla*, Bl. En. Fil. Jav. p. 212 ("fide specim. in Herb. Paris," *Ag.*), and of *Ag. Sp. Gen. Fil. p.* 30, but to me it appears a common form of *Pt. quadriaurita;* the same is found in Penang by Lady Dalhousie, with a red, subscabrous stipes and more numerous pinnæ. South Ilicos, Philippine Islands, *Cuming,*

n. 253 and 413, var. *setigera*, pinnæ narrow, long-caudate, spinules on the rachises copious, and setæ on the costæ of all the segments, stipes and main rachis rough (Tab. CXXXV. A). This is remarkable for the copious spinules on the rachises of the pinnæ, and the lesser ones or setæ on all the costæ of the segments. It is the *Pt. asperula*, J. Sm., name only, in Hook. Journ. of Bot. iii. p. 405. China, Hongkong, *Seemann*, *n.* 2384. In India a not uncommon form of the species now under consideration has been named by Dr. Wallich (Cat. n. 104) *Pt. subquinata*, and retained as such by Agardh, Sp. Gen. Pterid. p. 21; but it is simply a small and broadstate of *Pt. quadriaurita*, with few (5–8 or 10) pinnæ, gradually however passing into the more copiously pinnated states. We have such from Nepal, Kumaon, *Strachey and Winterbottom*, *n.* 5, 3000 feet elev., and *Dr. Wallich*, Pt. Grevilleana, *Wall. Cat. n.* 2680, *Ag. Sp. Gen. Pterid. p.* 23 (pinnæ 3–5). Bhotan, *Griffith*; with this are specimens having only three pinnæ, and others with simply a lanceolate, pinnatifid frond, yet bearing copious fructifications. Island of Bonin (*Imp. Acad. Petersb.*).

Africa.—Senegambia, *Heudelot*. Fernando Po, *Dr. Vogel*, *Capt. Trotter's Niger Expedition*, *Mr. Barter in Dr. Baikie's Second Niger Expedition*, 1857 (the prototypes of this in almost everything but the venation, *Pt.* (Campteria) *nemoralis* and *biaurita*, are also sent from tropical Africa). Madagascar, *Dr. Lyall* (Pt. pyrophylla, *Bl., according to Agardh*).

Pacific Islands.—Abundant in Feejee, Solomon's group, and adjacent islands, *Macgillivray and Milne, in Denham's Voyage of the Herald*; but all the numerous specimens are dark, rather bright green, the stipites and main rachises black, and very glossy; it is probably included in the "Pt. nemoralis, *Willd.*," of Brackenridge's Filices of the United States Exploring Expedition. Dr. Harvey's specimens, which he gathered in the Feejee Islands, are similar, but with the stipes and main rachises castaneous.

Tropical America.—Jamaica, *Macfadyen*, large membranaceous pinnæ very deeply pinnatifid, Pt. Blumeana of *Ag. Sp. Gen. Pterid. p.* 23 (the specimen from Jamaica). Blue Mountains, *Purdie*, stout, firm, rigid, pinnæ numerous, acuminate, not caudate. Mexico, *Liebmann* (Pt. nemoralis, *Liebm.*), *Galeotti*, *n.* 6291 (Pt. nemoralis major, *Mart. et Gal. Fil. Mex. p.* 53). Quebrada of Huanacabra, Peru, *Mathews*, *n.* 982, very large, frond nearly 3 feet long, with numerous pinnæ, 8–10 inches long. Guatemala, *G. U. Skinner*, *Esq.*, common East Indian form. Coyba, Panama, *Seemann*, *n.* 48, caudate pinnæ and segments broad, less deeply pinnatifid than usual; Boquete, Panama, common form, but large, *Seemann*, *n*, 1119. Tablaso, N. Granada, *Hostton*, *n.* 51. Venezuela, *Moritz*, *Fendler*, *n.* 103, *Linden*, common forms. Caracas, *Birschell* (same as from Jamaica). Minas Geraes, Brazil, *Gardner*, *n.* 5302 (same as the preceding).

The Fern here referred to *Pt. quadriaurita* is that which Agardh ascertained to be so by an inspection of the original plant in the Retzian Herbarium; but it is clear that this has been by many botanists considered to be the *Pt. nemoralis* of Willdenow, or the *Pt. biaurita*, L. Presl and others have shown that the latter author, in his herbarium, has confounded two species, and indeed in Presl's views two genera (*Campteria* and true *Pteris*), under that name. The *Campteria* Agardh has no doubt correctly referred to *Pt. biaurita*, L. *Pt. nemoralis* he retains, and places next to our *Pt. quadriaurita*, with characters however which would seem to combine these two species (or genera), and my own investigations would lead to this conclusion.*—See our *Pt.* (Campteria?) *nemoralis*.

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* Rather than add needlessly to the array of synonyms under *Pt. quadriaurita*, or appear to treat lightly the views of one so experienced in the study of Ferns as Mr. J. Smith, I here give in a note his character of a *Pteris* long known to him and long cultivated in the gardens of Kew under the name of

Pt. (Eupteris) *felosma*, J. Sm.; "fronds pinnate, pinnæ sessile lanceolate deeply

39. Pt. (Eupteris) *pungens*, Willd.; "fronds pinnate, pinnæ subpetiolate lowest ones bipartite, segments linear-lanceolate serrated at the base equally and broadly confluent, veins forked inferior basal one geminate proceeding from the costa, stipes externally aculeate and purplish," *Ag.*—*Willd. Sp. Pl.* v. *p.* 387 (*according to Ag.*). *Ag. Sp. Gen. Pterid. p.* 28. Pt. macroura, *Willd. Sp. Pl.* v. *p.* 380. Pt.

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pinnatifid, the apex caudate and entire the lower pair bipartite, costæ spinulose on the upper side, laciniæ linear-lanceolate obtuse entire slightly falcate, veins forked close to the costula free the pair terminating in the sinus of the laciniæ." *J. Sm. En. Ferns of Kew, Dec.* 1845; *Comp. to Bot. Mag.* lxxii. *p.* 24; *Cat. Kew Ferns, p.* 4; *Cat. Cult. Ferns, p.* 36.

Hab. "Jamaica. Cult. in (since) 1822.—Fronds 2-3 feet high, rising from an erect rhizome. Pinnæ 6–8 inches long, terminated by a long, lanceolate cauda."

Now in all the above characters there is nothing whatever at variance, but everything to correspond, with the common form of *Pt. quadriaurita*, with which the author does not compare it, but says, in regard to its affinities: "It has been long known by the names of *Pt. Plumieri* and *Pt. nemoralis*, but the latter is given under *Campteria:* and as the figure of Plumier, Fil. t. 15, is also quoted for *Pt. biaurita*, which can only be known as distinct from the present species by the anastomosing of the lower veins, and which characterizes *Campteria* from true *Pteris*, I therefore view this as an undescribed species; and as my attention has often been called to it by its peculiar smell, I have chosen to designate it by the above name. I possess native specimens of the same from Jamaica."—I, too, possess specimens from Jamaica, which I believe to be identical, but which are certainly included in what I venture to consider *Pt. quadriaurita*. Kunze retains the species, or at least the name, in his Index Fil. Hort. Europ., without any remark. Mettenius, on the other hand, unhesitatingly refers it to *Pt. repandula*, Link, making it a synonym along with *Pt. Blumeana*, Ag., and gives India, Brazil, and Columbia as the native countries. (See Metten. Fil. Hort. Bot. Lips. p. 57.) The peculiar odour to which Mr. J. Smith alludes, arises from some minute glandular hairs, chiefly on the under surface of the frond, but which are quite scentless in the dry state.

Of *Pteris sulcata*, Hort. Berol., Mr. J. Smith remarks: "This is so like my *Pt. felosma*, that I hesitated whether it was truly distinct: its chief difference is the smaller size, and its being quite destitute of the odour of that plant. Our cultivated plant from Berlin seems to be identical with *Pt. quadriaurita*." This is assuredly the same that Mettenius describes as

Pt. (Eupteris) *sulcata*, Meyen, MSS.; "rhizome erect, petiole 1′ long straw-coloured sparingly paleaceous, lamina 2′ long membranaceous finely pubescent on the costa beneath ovate acuminate pinnatisected, segments shortly petiolate deeply pinnatipartite, costa at the base of the costulæ with a spinulose seta, laciniæ confluent into a wing separated by broader sinuses from a broad base oblong with a thin callous margin rounded at the apex obtuse slightly repand, lowest segments bipartite or at the base below pinnatisected, secondary segments nearly equal to the primary one, nervation of *Eupteris*, veins forked, branches free the lowest ones extending a little above the sinus."—*Metten. Fil. Bot. Hort. Lips. p.* 57. *Kunze, in Linnæa*, xxiii. *p.* 290, *name only. J. Sm. En. Ferns, Hort. Kew. p.* 55.

Hab. China (*Mettenius*).—Smith gives this species as of Link, "Hort. Berol.," but I do not find it in any of the editions of that work, and indeed Kunze quotes as a synonym "*Pt. nemoralis, Lk. ad part.*"

acuminata, *Desv.* (*fide Ag.*). Pt. biaurita, β edentula, *Kze. in Linnæa*, ix. *p.* 75? *Plum. Fil. t.* 13 *and* 14 (*Ag.*).

Hab. Martinique and Hispaniola, *Plumier.* French Guiana, *Leprieur.* Trinidad, *Sir Ralph Woodford.* Porto Rico, *Baron de Shack.* Peru? *Pœppig.*—This is a large handsome-growing plant, of which the figures in Plumier are perhaps less exaggerated than usual, yet, except the greater size, I do not see how it is to be separated from our *Pt. quadriaurita.* Willdenow says it is distinguished from its allies by the aculeated stipes (our plant from Porto Rico, referred to by Agardh, has the stipes quite smooth), and by the lower pinnæ, not the lowest only, being bipartite. Agardh, on the other hand, who has examined Plumier's original plant, as well as other specimens, remarks that he has only seen the lowest pinnæ bipartite, as in our specimens. The name (*"pungens"*) is given by Willdenow, no doubt from the presence of the spinules seen at the union of the costule with the costa, represented, but much exaggerated, by Plumier, tab. 14; but they are common to most, if not all, of this group. My original specimens of Kunze's *Pteris biaurita*, β, are very different from our *Pt. biaurita*, and may perhaps be referred here. They have nothing of the venation of *Campteria*, to which genus or section that species is now referred.

40. Pt. (Eupteris) *deltea*, Ag.; frond a foot long ovate-acuminate membranaceous pinnate, pinnæ (about 13) subpetiolate lanceolate acuminate caudate lowest pair with two unequal pinnæ at their base all of them pinnatifid even to the rachis so as to be almost pinnulate, segments lanceolato-triangular sharply acuminate subserrate decurrent at the base, veins obscure forked near the middle, sori elongated, involucres narrow, stipes and main rachis brown, secondary rachises stramineous. (Tab. CXXXV. B.)—*Ag. Sp. Gen. Pterid. p.* 33.

Hab. Otaheite, *Menzies* (not Mathews, as in Agardh). The form of the segments, so deeply cut indeed as to be almost distinct pinnules, is very peculiar; nevertheless it may possibly prove to be an abnormal form of *Pteris quadriaurita.* Our specimen, described by Agardh, is unique as far as we know.

41. Pt. (Eupteris) *excelsa*, Gaud.; frond ample 5–6 feet long submembranaceous light green pinnate, pinnæ large remote 6 inches to a foot long numerous ovato-lanceolate caudate sessile, lower ones long-petiolate, lowest pair of pinnæ bipartite all deeply pinnatifid nearly to the costa, segments (2–4 inches long) from a broad base linear-lanceolate obtuse serrated subfalcate lower base decurrent, veins free forked at or near the middle, involucres continuous from the base almost to the apex rather broad, stipes very stout and flexuose, rachises bright castaneous glossy. (Tab. CXXXVI.)—*Gaud. in Freyc. Voy. Bot. p.* 388. *Ag. Sp. Gen. Pterid. p.* 21. *Brackenr. Fil. of the U. S. Expl. Exp. p.* 115. Pt. terminalis, *Wall. Cat. n.* 101. *Ag. Sp. Gen. Pterid. p.* 20. *Brackenr.*

Fil. of the U. S. Expl. Exp. p. 115. Pt. firma, *Wall. Cat. n.* 100 *(segments ½ an inch broad).*

Hab. East Indies: Nepal and Silhet, *Wallich;* Simla, *T. Thomson* (8000 feet), *Col. Bates;* Garwhal, *T. Thomson;* Kumaon, *Blinkworth, Edgeworth, Strachey and Winterbottom.* Mountains of Ava (very large, lower bipartite pinnæ 16 inches long, segments ½ an inch wide), *Wallich.* Mountains near Baños, Luzon, *Brackenridge.* Sandwich Islands, frequent, *Gaudichaud, Brackenridge (and in Herb. Hook. and Lindl.).*—This, judging from the comparatively small portions in our herbaria, must be one of the very finest species of this group or subsection of *Pteris;* and yet, except in size and the more deeply cut, almost pinnulated pinnæ, it is not easy to say how it is specifically distinct from some forms of *Pt. quadriaurita,* while in the broad and decurrently confluent bases of many of the segments it resembles *Pt. deltea.* It could only be the widely different localities that induced Professor Agardh to keep *Pt. terminalis* of Wallich distinct from *Pt. excelsa* of Gaudichaud; for he well observes of the latter, "Antecedenti (*Pt. excelsa*) simillima et forsan nimium affinis."

42. Pt. (Eupteris) *ligulata,* Gaud.; "fronds ternato-pinnate, pinnæ pinnato-partite auriculate, auricles elongate ensiform undivided (*integræ*) coarsely serrated or lobed, segments linear-lanceolate subdecurrent, veins forked the lowest springing from the costa," *Ag.—Gaud. in Freyc. Voy. Bot. p.* 385. *Ag. Sp. Gen. Pterid. p.* 23.

Hab. Vaigiou, Molucca Islands, *Gaudichaud.*—This Fern is quite unknown to me. Gaudichaud arranges it in the same section with *Pt. pedata,* Willd., and *Pt. geraniifolia,* Raddi; but Agardh, who appears to have possessed specimens and to have seen others in the Herbarium of Delessert and of the Paris Museum, places it between his *Pt. Blumeana* and *Pt. Grevilleana,* Wall. (both of which we are disposed to refer to *Pt. quadriaurita*), and he says of it, "Species valde paradoxa; *Pt. Grevilleanæ* mihi videtur proxima, licet ab hac quoque non parum discrepat. Neque inter species *Adiantoideas* (*Pellæa,* nobis) jure disponitur."

43. Pt. (Eupteris) *arguta,* Ait.; fronds ample pedately ovate firm-membranaceous pinnate, lowest pair of pinnæ bipartite or unequally pinnate, all the pinnæ petiolate lanceolate acuminate (a span to a foot long) deeply pinnatifid nearly to the costa, segments 1–2 inches long narrow lanceolate subfalcate acuminate sharply serrated broadest and decurrent at the base, veins forked near the middle lowest inferior one arising from the main costa bifurcate its veinlets spreading, sori broad abbreviated extending from the base of the sinus to the middle, stipes elongated and rachises smooth stramineous or castaneous very glossy.—*Ait. Hort. Kew. ed.* 1. *p.* 458 (1789), *ed.* 2. *p.* 520. *Vahl, Symb.* i. *p.* 84 (1790). *Sw. Syn. Fil. p.* 98. *Willd. Sp. Pl.* v. *p.* 387. *Ag. Sp. Gen. Pterid. p.* 36. *Seuber, Flor. Azor. p.* 15. *Webb, Phytog. Canar. sect.* 3. *p.* 450. Pt. serrulata, *Försk. Fl.*

Ægypt. Arab. p. 187, *fide Ait. (non Linn. fil.)* Pt. incompleta, *Cav. (Willd.).* Pt. palustris, *Poir. (Webb).*

Hab. Arabia, *Förskal.* Madeira, Canary Islands, the Azores (*Seuber*), *Masson, and all travellers.* Portugal (*Herb. Gundelsheimer, Schlecht.*), rare, Serra de Cintra, *Welwitsch, in Herb. Nostr.*—Förskal, if Aiton is correct in referring his *Pt. serrulata* here, is the first botanist who appears to have recognized and described this species, as an Arabian Fern; though Agardh is of a different opinion, and says on the *serrulata* of Förskal, "Quoad descriptionem ad veram *Pt. serrulatam* referre mallem." The 2nd edition of 'Hortus Kewensis' gives the Cape of Good Hope as a locality, as does Schlechtendal (who adds Mauritius), and probably they are not far wrong in doing so, as Brackenridge cites St. Helena; but the *Pteris* here intended is now generally considered a distinct species, the *Pt. flabellata*, Thunb., as is the Azorian specimen by Agardh, in my herbarium, although in his 'Spec. Gen. Pteridis' he places it under *Pt. arguta.* Our present plant is indeed one very difficult to define specifically. It is usually of a firm texture, dark full green colour, the segments of the pinnæ gradually (but not finely) acuminate, distinctly serrated; with abbreviated sori generally commencing at the base and not extending beyond the middle of the segments. More or less these characters prevail in the following supposed species, and our Azores plant has assuredly as strong a claim to be ranked with the one as with the other. *Pt. quadriaurita* chiefly differs by the blunter and entire segments of the pinnæ.

44. Pt. (Eupteris) *flabellata*, Th.; fronds ample pedately ovate membranaceous pinnate, pinnæ generally sessile lanceolate acuminate lowest pair of pinnæ bipartite or unequally pinnate a span or more long deeply pinnatifid nearly to the costa, segments 1–1½ inch long linear or linear-oblong subfalcate scarcely acuminate rather obtuse serrate broadest and decurrent at the base, veins forked near the middle lowest inferior one arising from the main costa bifurcate its veinlets spreading, sori rather narrow elongated often extending from the base of the sinus nearly to the apex of the segments, stipes elongated and rachises smooth stramineous very glossy. —*Thunb. Prodr. F. Cap. p.* 733. *Sw. Syn. Fil. p.* 99. *Willd. Sp. Pl.* v. *p.* 396. *Ag. Sp. Gen. Pterid. p.* 37. "Pt. elegans, *Jacq. Fragm. p.* 74. *t.* 116" (*Kze.*). Pt. arguta, *Schlecht. Ad. Fil. Prom. Bon. Sp. p.* 43. *Kze. in Linnæa*, vi. *p.* 186, *et in Rev. Acot. Afr. in Linnæa*, x. *p.* 524.—Var. *Americana;* stipes brownish, *Ag. Sp. Gen. Pterid. p.* 37. "Pt. lata, *Link, Hort. Berol.* ii. *p.* 28."—Var. *Ascensionis;* stipes sometimes rough at the base, frond 6 inches to a foot high. Pt. Ascensionis, *Sw. Syn. Fil. pp.* 100 *et* 294. *Schkuhr, Fil. t.* 94. *Willd. Sp. Pl.* v. *p.* 400. Lonchitis Ascensionis, *Forst. in Com. Soc. Gœtt.* ix. *p.* 72.

Hab. South Africa, *Thunberg and various travellers:* Table Mountain, *Dr. Alexander;* Uitenhage (*Harvey, n.* 528, *in Herb. Nostr.*); Macalisberg, *Zeyher and Burke, Mr. Sanderson* (pinnæ elongated, segments quite linear). St. Helena, *Cuming, n.* 425, *Dr. Hooker* (southern declivity of Diana's Peak). Abyssinia,

by streams in mountain districts near Sabra, *Schimper, It. Abyss. U. It.* 1842 (common form), and *Schimper, Herb. Mus. Par.* 1853, *n.* 280, larger, 6 feet high, including the stipes, frond glaucous, stipes glossy, as if varnished, dark brown near the base, above bright chestnut-colour on one side, stramineous on the other (*Herb. Nostr.*). Var. *Americana*, "*St. Vincent* (*Herb. Hook.*)? Brazil (*Link*)" *fide Ag.* — Var. *Ascensionis*, Island of Ascension, *Forster, Dr. Curror, Dr. Hooker*, (Green Mountain, 1200–1800 feet elev., erect or prostrate), *Seemann.*—In the present case, as with many other Ferns, I fear it is only the very southern locality that induced Thunberg and other able botanists to separate *Pt. flabellata* from *Pt. arguta*; there is hardly any other difference than the more membranous and softer texture and elongated sori to distinguish the present one. *Pt. Ascensionis* owes its dwarf and stunted form to the bare and exposed rocks of the "Insula sterilissima Ascensionis," as Swartz calls it.

45. Pt. (Eupteris) *paleacea*, Roxb.; 3–5 feet high, fronds spreading horizontally 1–2 feet and more long subcordate coriaceous very firm and rigid glossy pinnate below tri–subquadripinnate, pinnæ close-placed compact, lowest primary pinnæ half-cordiform bearing their pinnæ and pinnules on the lower or inferior side, superior pinnæ and pinnules sessile all lanceolate deeply pinnatifid nearly to the rachis, segments from ½ an inch to an inch long from a broad base linear-oblong subfalcate obtuse quite entire, veins forked, involucres intramarginal copious throughout the whole frond rigid-membranaceous brown not extending to the base nor the apex of the segments, stipes 2–4 feet long stout and as well as the principal rachises beneath very shaggy with copious large dark-brown crisped scales which are deciduous leaving rigid prominent prickly tubercles on the pale-brown surface. (Tab. CXXXII. A.)—*Roxb. in Beatson's Fl. of St. Helena, p.* 349; *ejusd. Bot. of St. Helena (not paged). Ag. Sp. Gen. Pterid. p.* 33.

Hab. Summit of Diana's Peak, St. Helena, *Menzies, in Herb. Nostr., Roxburgh*, and all botanical visitors of that Peak, *Cuming, n.* 424, *Nuttall, Dr. J. D. Hooker*, etc.—At first sight this would appear to be one of the most distinct and remarkable of Ferns, bearing however a certain relationship in general aspect to, and having the ramification of, the "*quadriaurita*" group. Dr. Hooker observes in his notes that "the nearly horizontal fronds are upon stipites that are from 2–4 feet high." These stipites are stout, the upper part at least triangular and glossy, peculiarly shaggy in the earlier stages of the plant, with copious, chaffy, dark-brown scales, continuing up among the rachises on the under side, and when these fall off, leaving the stipes quite prickly with short, dark-coloured, hard tubercles. The fronds, very harsh and rigid, turning blackish-brown in drying, especially the upper side; beneath, the colour in the herbarium is dark olive-green. This strange peculiarity of aspect however would seem to be due to locality, if the late Professor Kunze is correct in his statement in *Linnæa*, vol. xxiii. p. 321, under *Pt. flabellata*, Th., "Inter sporas a *Pt. paleacea* collectionis Cumingianæ depromptas et cassas, hæc species, in collectione dicti illi adposita, ut in Filicum cultura fieri solet, enata est."

46. Pt. (Eupteris) *scabra*, Bory; frond ample pedately

ovate pinnate, lower pair of pinnæ bipartite or again pinnate chiefly on the lower side, all the pinnæ and pinnules lanceolate acuminate sessile coriaceo-membranaceous subscabrous minutely pellucido-punctate pinnatifid not to the base (but so as to leave a rather broad uniform membrane on each side the main costa) with subopposite lanceolate subfalcato-acuminate serrated segments decurrent at the base and there even subauriculate, veins thick forked 4 or 5 (often simple) are situated within the decurrent base and arise from the costa, sori narrow often extending nearly to the apex of the segments, stipes elongated blackish-purple glossy. (Tab. CXXXVIII. A.)—*Bory, in Willd. Sp. Pl.* v. *p.* 386 (*not Gaud.*). *Ag. Sp. Gen. Pterid. p.* 31. Pt. angusta, *Bory, in Willd. Sp. Pl.* v. *p.* 388 (*Ag.*). Pt. elastica, *Tausch. in Sieb. Fl. Maurit. n.* 15 (*fide Presl*). Pt. Mascarenensis, *Spreng. Syst. Veget. p.* 75 (*fide Presl*). ? Var.; stipes stramineous, *Ag. l. c. p.* 32.

Hab. Woods in Mauritius and Bourbon, *Bory, Néraud, Bojer and Bouton in Herb. Nostr.* Var.? with stramineous stipes; Bourbon, *Carmichael in Herb. Nostr.*—Agardh remarks of this, "Species pulcherrima cum nulla alia confundenda." It has indeed a peculiar appearance for one of this (which may be called) the *quadriaurita* group. It is of a somewhat coriaceous texture; the segments are singularly decurrent at the base (almost auricled), and nearly opposite, not so deeply pinnatifid as in *Pt. arguta* and *Pt. flabellata:* the texture, too, is remarkable, when held up between the eye and the light, full of minute pellucid dots. The veins are particularly conspicuous, thick, and 4 or 5 spring from the main costa, occupying the decurrent subauriculated base. I am doubtful if the variety from Bourbon, above alluded to, be identical. It partakes of some of the characters and some states of *Pt. flabellata*, or, as Captain Carmichael had named it, *Pt. arguta.*

47. Pt. (Eupteris) *Swartziana*, Ag.; "frond pinnated, pinnæ shortly petiolate subpinnatisected with the lowest pair often pinnulated, segments triangular-lanceolate obtuse serrated subdecurrently confluent at the base, veins forked basal inferior one arising from the costa, sori elongated, stipes eventually castaneous."—*Ag. Sp. Gen. Pterid. p.* 34. "Pt. biaurita, *Sw. Syn. Fil. p.* 98 (*excl. the synonyms and localities*). *Willd. Sp. Pl.* v. *p.* 384 (*excl. syn.*). *Link, Hort. Berol.* ii. *p.* 28. *Hook. et Grev. Ic. Fil. t.* 142. Pt. allosora, *Link, Hort. Berol. p.* 31 ? (*fide spec. from H. Berol. sent to Mr. J. Smith*)." *Ag.*

Hab. West Indies, Jamaica, *Higson* (*Herb. Grev.*), *Bancroft, in Herb. Nostr.* (named by Agardh, but it has narrower segments than in the figure of Ic. Fil. l. c. and more the character of *Pt. flabellata*), *Purdie* (exactly corresponding with the figure just mentioned). Isle of Bourbon, *Commerson* (*Ag.*).—A Fern, as it appears to me, almost intermediate between *Pt. quadriaurita* and *Pt. flabellata*, necessarily partaking not a little of the character of *Pt. arguta.* The learned Agardh confirms our views, expressed in the 'Icones Filicum,' of its being

the *Pt. biaurita* of Swartz and Willdenow, though not of Linnæus, which is a species having more or less anastomosing veins, but it is never the case with this. Our figure in the 'Icones Filicum' will show what is intended by this species.

48. Pt. (Eupteris) *Kingiana*, Endl.; "frond pinnated, pinnæ subpetiolate pinnatisect the lowest ones pinnulate, segments lanceolate-linear obtuse serrated decurrenti-subappendiculate, veins forked basal inferior one arising from the main costa bifurcate, stipes and costa (the latter sometimes stramineous) black-purple glossy," *Ag.—Engl. Prodr. Fl. Norfolk. p.* 13. *Ag. Sp. Gen. Pterid. p.* 34.

Hab. Moist shady places, Norfolk Island, *All. Cunningham, C. J. Simmons, Esq., Dr. V. Thomson, Milne, in Denham's Surveying Voyage*, "Species, ut crediderim certe distincta, at characteribus difficilius circumscribenda. Frons tota atro-virescens, costis discoloribus variegata, inter pulchriores totius generis."—I can agree with most of the above observations of Agardh; yet were it not for the high authority of Endlicher and Agardh, I should be disposed to consider it one of the many forms of *Pt. tremula*, of which I have recently received specimens from New Zealand that I can scarcely distinguish from what Agardh has considered and marked as *Pt. Kingiana*, from Norfolk Island. Agardh is of opinion that this is the South African *Pt. elegans* of Jacquin, which Kunze, with more justice, perhaps, refers to *Pt. flabellata*. (See our notes on the affinity of *Pt. tremula*, p. 175, with *Pt. arguta*.)

49. Pt. (Eupteris) *Trattinickiana*, Endl.; "frond membranaceous tripartite, branches pinnate, pinnæ pinnatifid, segments oblong-linear obtuse distinct (*discreta*) sharply serrulate, veins forked, sori interrupted."—*Endl. Prodr. Fl. Norfolk. p.* 14. *Ag. Sp. Gen. Pterid. p.* 44, *note.*

Hab. Norfolk Island, *Ferd. Bauer* (*Endl.*). "Rami pinnati laterales divaricato-patentes. Pinnæ approximatim alternæ, paribus 1½–2 pollicares dissitis, 4–5-pollicares, usque ad costam pinnatifidæ. Laciniæ oblongo-lineares, erecto-patentes obtusæ, 9 lineas longæ, 3 lineas latæ, alternæ, discretæ, infima basi subpinnatifidæ, omnes argute serrulatæ. Indusia membranacea, interrupta, sæpius unilateralia."—If this had been placed by Endlicher next to his *Pt. Kingiana*, I should have thought it quite likely to be a state of that plant, passing into *Pt. tremula*, and the venation is the same (§ *Eupteris*); but he has placed his *Pt. Zahlbruckneriana* between the two, which is of the *Litobrochia* section. I am still disposed to consider it may be such, as some of my New Zealand specimens of that very variable plant *Pt. tremula* sufficiently correspond with it.

50. Pt. (Eupteris) *pyrophylla*,* Bl.; "frond pinnated, pinnæ petiolate subpinnatisect, lower ones auriculated the lowest ones pinnulate, segments oblong linear obtuse entire equal at the base, veins forked the basal ones arising from the axil of the costule and terminating at the margin above the sinus, stipes purplish-brown," *Ag.—Bl. En. Fil. Jav. p.* 212. *Ag. En. Sp. Gen. Pterid. p.* 30. Pt. nemoralis, *Wall. Cat. n.* 106 *a. (fide spec. Soc. Linn.—Ag.)*

* See under *Pt. quadriaurita*, n. 38. p. 180.

Hab. Java, *Blume.* East Indies, mixed with *Pt. nemoralis, Wallich.* Mauritius and Madagascar, *Bojer, in Herb. Hook.*—Too near, I fear, *Pt. quadriaurita.*

51. Pt. (Eupteris) *catoptera*, Kze.; "frond thin coriaceous finely alutaceous beneath (*subtilissime alutacea*) and sparsely setulose pinnated, pinnæ subsessile ones lowest pinnulated downwards, segments (spinuliferous above) confluent at the base oblong-linear obtuse entire, veins forked the basal ones extending to the margin above the sinus, stipes rachis and costa stramineous," *Kze. in Linnæa*, xviii. *p.* 119.—Pt. biaurita, *Kze. Recens. Nov. Fil. Cap. in Linnæa*, x. *p.* 436. Pt. nemoralis, *Ag. En. Sp. Gen. Pterid. p.* 25 (*in part*).

Hab. Port Natal, *Gueinzius.*—"In vicinitate *Pt. pyrophilæ* (s. *Pyrophyllæ*) ut dicitur, collocanda."

52. Pt. (Eupteris) *Novæ-Caledoniæ*, Hook.; frond ample bright-green membranaceous pinnate (below bipinnate ?), pinnæ petiolate a span and more long lanceolato-acuminate deeply pinnatifid down to the rachis, segments linear or linear-lanceolate almost horizontal straight (not falcate) rather obtuse strongly serrated close-placed leaving a very narrow sinus, inferior ones truly apart so that the pinnæ are below pinnated slightly decurrent (but not dilated) at their base, veins simple or forked all arising from the costule, sori abbreviated broad copious on almost every segment, on the upper segments generally confined to the inferior margin, main rachises bright-castaneous glossy, principal costæ passing into stramineous.

Hab. New Caledonia, on the ground, in low, moist situations: fronds sometimes 10 feet high, *Mr. C. Moore* (of Sydney).—At the risk of being considered to be adding needlessly to the number of species of the *Quadriaurita* group, I still venture to consider the present truly distinct. I regret that though the specimens are otherwise in a beautiful state, and 2 feet long, they do not exhibit the lower ramifications of the frond. The aspect is very peculiar, from the distinctly petiolated pinnæ, the small (1 inch long) narrow segments of a bright green colour, cut down to the very costa, some even quite free, their close proximity to each other sometimes closing the very narrow sinus, and from the very copious broad sori, so that, looking at the back of the frond, there is as much space occupied by the red-brown fructifications as by the green frond, though the sori are abbreviated, and though the upper segments have only the lower margin soriferous. The veins are obscure, but none seems to spring from the main costa, all from the costules. It is very different from *Pt. arguta*, which nevertheless may be its nearest affinity.

53. Pt. (Eupteris) *Crœsus*, Bory; "fronds bipinnate below, the pinnules subpetiolate pinnatisect, the segments triangular-oblong obtuse dentate decurrent at the inferior base excised and nearly separated (*discretis*) at the superior base,

veins forked, lower basal one arising from the costa twice forked, sori whitish, stipes black-purple," *Ag.—Bory, It.* ii. *p.* 192 (*fide specim. in ips. Hbrio. Ag.*). *Sw. Syn. p.* 103. *Willd. Sp. Pl.* v. *p.* 372. *Ag. Sp. Gen. Pterid. p.* 39.

Hab. Bourbon, in rocky places, *Bory.*—I am unacquainted with this species, and am equally ignorant of its affinities. Agardh, who has examined and described it from authentic specimens, places it the first in a section along with *Pt. Pseudo-Lonchitis*, Bory (which is a *Campteria*, Pr.), and *Pt. tremula*, Br., and *Chilensis*, Desv., etc. Bory, its discoverer and first describer, says, "Cette belle plante a quelques rapports avec notre *Pteris argentea*" (Cheilanthus farinosa, *Kaulf.* and this work) "et avec le *Pteris biaurita*, L.;"—two plants having very little connection with each other. The lower pinnæ, that author says, are opposite and bipartite; lower segments, especially externally, pinnate or pinnatifid; the margins crenate. Willdenow places it between "*Pt. aspera*, Lam.," and *Pt. denticulata* (Litobrochia, *Pr.*). Swartz refers it to his group of *Pteris*, which has the dark glossy stipes of *Adiantum;* and Fée to the *Aquilina* group, next to *Pt. esculenta*, but whether from a personal knowledge of the plant or not we are ignorant.

54. Pt. (Eupteris) *aspera*, Lam.; "fronds pinnate, pinnæ lanceolate acuminate entire truncate at the base rounded above (*sursum rotundatis*), lower ones striated crenated, stipes rough."—*Lam. Cycl.* v. *p.* 713. *Sw. Syn. Fil. p.* 102. *Willd. Sp. Pl.* v. *p.* 372 (*not* aspera, *Fée*).

Hab. Cayenne (*Lam.*).—Swartz places this in the same group with *Pt. Cræsus* (our foregoing species), Lamarck among some very dubious species, but near *Pt. crenata*, as Willdenow has done. It is in vain to guess its affinity.

55. Pt. (Eupteris) *deflexa*, Lk.; frond ample tri-quadripinnate (primarily ternate) coriaceous firm rigid, pinnules petiolate lanceolate gradually acuminate deeply almost to the base pinnatifid, segments subtriangular-oblong slightly falcate curved upwards mucronate and spinuloso-serrate in the sterile portions, veins conspicuous prominent simple lower ones forked lowest one arising from the base of the costa, sori not reaching to the apex, stipes and rachises stramineous.—Pt. deflexa, *Link, Hort. Berol.* ii. *p.* 30. *Ag. Sp. Gen. Pterid. p.* 41. *Metten. Fil. Hort. Lips. p.* 58.

Hab. Brazil, *Sellow* (*ex Herb. Reg. Berol.*). Shady places about Rio, *Gardner, n.* 152. Caracas, *Linden, n.* 178, *Birschel;* Tovar, Venezuela, *Fendler, n.* 101, *Moritz.*—One of our specimens (from Fendler) possesses a caudex, which is short (2–3 inches), thick, densely clothed with copious long silky wool, as are the long fibrous radicles. Stipes 2 and more feet long, rough or slightly muricated towards the base. Fronds from a foot and a half (according to Mr. Gardner, 4–5 feet) high. Our specific character is drawn up from an authentic specimen of the Berlin Herbarium. Agardh, who appears to have had the advantage of inspecting similar specimens, says of it, "Species cum nulla alia confundenda;" yet he adds: "Diu pro *Pt. palustri*, Gaudich. (Pt. Gaudichaudii, *Ag.*, and of this work) habui, et, excepta decompositione et ramificatione frondis,

nimium fere huic convenit; pro certo itaque species esse distinctas affirmare noluerim, licet hucusque tantas ramificationis differentias in una eademque specie obvenire haud observaverim." Our plant is remarkable for the harsh and coriaceous fronds, prominent venation, mucronate segments, and subspinulose serratures. It has also the spinules so common in the group to which *Pt. quadriaurita* belongs, and a small plant of this has exactly the same ramification as the ordinary form of that species; that is to say, subdeltoid, ternate (from the two lower pinnæ being opposite, and larger than the rest, and compound), with one or more pinnæ, of which those on the inferior side are longer than those of the superior (unequally pinnate). In texture, and general habit, this species is allied to *Pt. Jamesoni* and *muricata* and *coriacea*, but it wants the curiously muricated rachises and costa of those species, though there is an approach to that in the stipes being rough at the base.

56. Pt. (Eupteris) *Gaudichaudii*, Ag.; "fronds ternate, branches subsimple pinnate, pinnæ subpetiolate deeply pinnato-partite, segments triangular-lanceolate serrated mucronate, veins forked, the inferior basal vein arising from the costa and the superior one axillary extending to the margin above the sinus."—*Ag. Sp. Gen. Pterid. p.* 42. Pt. palustris, *Gaud. in Freyc. Voy. p.* 391 (*excl. synonym.*).

Hab. Rio Janeiro, Brazil, *Gaudichaud, Lund.*—"Stipes on the superior side brownish, scaberulous, tripartite. Branches elongated, with numerous pairs of pinnæ (14–16). Pinnæ 3–4 inches long, about an inch and a half (*ungue et dimidia vix latiores*) wide, almost pinnatisect or deeply pinnato-partite. Segments lanceolato-falcate, subdecurrently confluent at the base, sharply serrated, the terminal tooth mucronate. Substance rigid, coriaceous." This description sufficiently accords with our preceding species, *Pt. deflexa*, Lk.; so that Agardh's views of the very close affinity of the two plants, expressed under the latter species, may be considered correct.

57. Pt. (Eupteris) *pellucens*, Ag.; fronds ample membranaceous ternately divided lateral divisions as well as the intermediate ones multipinnate, pinnæ shortly petiolate lanceolato-acuminate long-caudate at the apex deeply almost to the rachis pinnatifid, segments spreading oblong-subquadrate obtuse subtruncate approximate sharply toothed at the apex, the base decurrent glabrous, sori lateral on the segments never extending to the sinus nor to the apex, veins rather remote all forked basal ones arising from the axil of the costula and extending to the margin much above the sinus, stipes and rachis brown or stramineous smooth.—*Ag. Sp. Gen. Pterid. p.* 43. *J. Sm. in En. Fil. Philip. in Hook. Bot. Journ.* iii. *p.* 405. Pt. intermedia, *Bl. En. Fil. Jav. p.* 211?

Hab. East Indies, *Wallich* ("Vidi in Hbriis. Banksii et Hornemanni," *Agardh*). Luzon, *Cuming, n.* 8. Java? *Blume.* Hills of Assam, *Simons, n.* 261. Bhotan, *Griffith, n.* 2816, *Booth.* Khasia and Sikkim, *Hook. fil. et Thomson.*—A distinct and well-marked species. Pinnæ 4–6 inches long, less than an inch wide, seg-

ments very regular, remarkable in the form of the segments, an oblong square, singularly obtuse or sometimes truncate, but sharply toothed at the apex. Spinules on the rachis at the base of the lobes frequent. By some accident this species does not seem to have been generally distributed by Dr. Wallich; at least I have never seen Wallichian specimens, which are the authority for the plant of Agardh. Like many other Ferns, it is common to Eastern Bengal and the Malay Islands. Blume's *Pt. intermedia* (not of Kaulfuss) seems to be the same plant, as far as can be judged from his brief character.

58. Pt. (Eupteris) *stridens*, Ag.; "lateral branches of the ternate frond bipartite, intermediate one pinnate, pinnæ lanceolato-acuminate pinnatisected, segments triangular-lanceolate entire cartilagineo-marginate and submucronate, veins forked distinct (*discretis*)."—*Ag. Sp. Gen. Pterid. p.* 45.

Hab. Jamaica, *Bancroft* (*Herb. Hook.*), *Lunan* (*Herb. Greville*).—"Stipes stramineous, and, together with the frond, a foot and a half high, glabrous and nearly smooth (*sublævis*). Fronds ternate, lateral branches scarcely a foot long, pinnated, sending down from below a pinnated auricle; intermediate branch pinnated, lowermost segment subpinnatifid. Pinnæ of the lateral branches usually alternate, of the intermediate one opposite, shortly petiolate, 2–5 inches long, scarcely more than an inch wide at the base, towards the apex gradually attenuated, pinnatisected. Segments approximated at the base, lanceolate, obsoletely falcate, margined with a very slender cartilaginous line, sterile ones entire, shortly mucronated at the apex. Veins all forked or simple, inferior basal one from the axil of the costa, superior one springing from a little above the axil. Indusia whitish, abrupt at each extremity ('*utrinque abrupta*,') obtuse. Colour dark green, and the substance of the frond is rigid and harsh (*stridens*)."—I have little to add to the above character and description. My own specimen, from which Professor Agardh drew up his description in part, is but a portion of a frond, a foot long. Dr. Greville's was evidently more perfect. Assuredly its affinity is with *Pt. deflexa*, Lk.; but the segments, though mucronated at the point, are quite entire at the margin.

59. Pt. (Eupteris) *coriacea*, Desv.; frond 1½–2 feet long broad-deltoid ternate (subpedate) coriaceous pale-green bitripinnate, pinnæ subpetiolate lanceolate finely acuminated into a serrated point pinnatifid nearly to the rachis (or confluently pinnate), segments linear falcate acute serrated mucronate and serrated at the apex beyond the sori, at the base more or less distinct, rachises and costa densely clothed with slender flexible spines, veins forked, involucres intramarginal continuous membranaceous, stipes and main rachis stramineous the latter chiefly rough with short rigid spines. (Tab. CXXIV. A.)—*Desv. in Mém. Soc. Linnéenne*, vi. *p.* 300. *Ag. Pterid. p.* 44.—Var. *β*; spinules on the rachises and costa all short and more rigid.

Hab. Peru, *Dombey;* Pariahuanca, *Mathews, n.* 1095. Var. *β*. New Granada, *Linden, n.* 1041. Ocaña, *Schlim, n.* 316. Tequendama, Bogota, *Holton, n.* 44.—This, allied in habit to the *Arguta* group, is a very remarkable species; the under side of the pinnæ and segments, but confined to the rachis and costa, are

prickly with compactly placed, slender, white or stramineous, rather long spines, of the same texture as the rachis, while the main rachis is merely rough with close-placed, small, elevated spinous points. It is a very fine and handsome species, with very narrow segments or pinnules.

60. Pt. (Eupteris) *Jamesoni*, Hook.; 1–2 or 2½ feet (perhaps more) high, frond a span to a foot and a half long deltoid subpedate coriaceous glabrous glossy above pinnate, superior pinnæ simple (undivided small) ½ an inch to an inch long, intermediate and inferior ones lanceolate much acuminate sessile or nearly so and again pinnate, lowermost pair bipinnate two or three of the lowermost of these pinnules much longer than the rest, ultimate pinnules (and the superior pinnæ) oblong-lanceolate subfalcate mucronate singularly decurrent and confluent sterile ones strongly spinuloso-serrate, veins sunk on the upper side elevated on the under simple or usually forked, involucres intramarginal on the most perfect specimen continuous from the base to the mucronated apex rather broad membranaceous, stipes longer than the frond stramineous rough on the under side as well as the rachises and costa of the pinnules with scattered spines of the same colour and texture as the stipes, costa and even the veins beneath partially chaffy with small deciduous ovate acuminate brown crisped scales. (Tab. CXXXIII. A.)

Hab. Andes of Quito, *Professor W. Jameson.* Ocaña, New Granada, *Schlim, n.* 330.—No species of *Pteris* can well be more distinct than this, and yet I find it impossible to give its distinguishing characters in a few words or a few lines. In one of its most remarkable features, the singularly hard and yet usually wavy spines of the under side of the stipes, rachises, and costa, of the same colour and texture as the stipes, it approaches *Pt. coriacea*, Desv., but it is a smaller and much less compound plant, with very much larger and broader ultimate pinnules, which are from half an inch to an inch long, and a line and a half to two lines wide. The spines however are much less numerous than in *Pt. coriacea*, especially on the costa of the pinnules, but they are there accompanied by scattered, curled, brown scales, of which there is no trace in that species. The strong spinulose serratures of the sterile portions of the plant entirely disappear in the fertile pinnules, and these have the involucres occupying the whole length of the margin, and rather a broad edge, formed of the substance of the frond; in other words, the sori are distinctly intramarginal. I have never received this plant, save from Professor Jameson, but from two different stations, and in different states of perfection, showing, by the presence of the essential characters in each, that the species may be considered a good one.

61. Pt. (Eupteris) *muricata*, Hook.; caudex?, frond 20 inches (and more?) long ovate acuminate coriaceous very rigid bi- below tri-pinnate, pinnæ petiolate opposite or nearly so in distant pairs primary superior ones and secondary inferior ones lanceolate long-acuminate into a serrated point, pinnules numerous compact confluent at the base linear-

oblong subfalcate acute and mucronate, those of the inferior primary pinnæ free distant entire or again pinnatifidly pinnate, veins forked, involucres intramarginal, stipes terete and flexuose, rachis ferruginous and costa beneath thickly muricated with hard spinous points. (TAB. CXXIII. B.)

Hab. Tropical America, Antioquia in New Granada, *Mr. Jervise.*—If not *sui generis* botanically speaking, it may truly be called *suæ speciei*, for I know none with which it can be confounded; in texture and somewhat in ramification it approaches the *Aquilina* group, but it is remarkable for the flexuose rachis, and that, together with the portion of the stipes which is attached to the frond, covered with numerous, close-placed, small spinous tubercles, or rather raised points. Something of the kind is seen on the stipes and rachis of *Pt. paleacea*, when the scales are fallen off.—Antioquia, the native country of our plant, is in the very centre of tropical America, between 5° 40′ and 8° north, long. 75° and 76° 30′ west, in the department of Cundinamarca, a country abounding in mountains, and almost unknown to the botanist, whom it would repay well in the exploring its vegetable riches.

62. Pt. (Eupteris) *muricella*, Fée; "fronds pinnated above and bipinnated at the base of a soft consistence transparent with oblong toothed segments crenulated at the apex having on the rachis of the pinnules and on the costa long sharp soft and whitish points, petiole strongly furrowed reddish, rachis whitish, sporothecia short occupying the middle of the lobes (*médians*) with a rather large reddish indusium." *Fée, Fil. 8me Mém. p. 73.*

Hab. Mexico, near Cordoba and Huatusco, *Schaffner, n.* 143.—"Soft and delicate species, allied to *Pt. repandula*,* Link, Sp. Fil. p. 56; but in our plant the apex of the segments is strongly crenulated, while it is said of *Pt. repandula*, 'pinnulis integerrimis,' a character found in the *Pt. nemoralis*, Willd."

63. Pt. (Eupteris) *paucinervata*, Fée; "fronds pinnate at the base and pinnatifid at the apex which is terminated by a long linear undulated point, rootstock (*souche*) upright with long greyish radicles, petioles smooth reddish glabrous, basal pinnules pinnatifid erect, sterile segments oblong toothed crenulated at the apex obtuse fertile segments entire falcate both with distant and very few nervils, sporothecia arising from the base of the segments rather large and furnished with a very small indusium."—*Fée, Fil. 8me Mém. p. 73.*

* It will be seen in a note at p. 182, that Mettenius considers *Pt. felosma*, J. Sm., and *Pt. repandula* identical. The latter is thus distinguished:—
"*Pt. repandula*, Link; fronde bipinnatifida, pinnellis lanceolatis subfalcatis obtusis integerrimis et repandulis, ala connectente angustissima. Brazil. *Pt. biaurita*, Hort. Berol. ii. p. 28.—Affinis *Pt. biaurita*, var. *edentula*, Kze., Linnæa, ix. 75, sed pinnulæ ad rachin separatæ."—All we know of this plant.

Hab. Mexico, near Mirador, *Schaffner, n.* 152.—The author offers no comparison between this and any other *Pteris;* I am therefore ignorant of its affinities. He only further adds that "it is a species very remarkable for the blood-red-coloured petioles, the caudiform appendage which terminates the pinnules, and for the distant nervils."

(*Involucre double! inner one sometimes obsolete. Fronds coriaceous, 3–4-pinnate, erect or scandent; margin of the pinnules strongly recurved. Caudex quite subterraneous, very long, creeping. Fronds distant on the caudex.*—PTERIS, § ORNITHOPTERIS, *Ag.;* § AQUILINOPTERIDEÆ, *Gaud.* ALLOSORUS, § AQUILINI, *Pr.*—Easily as the outer involucre of the *Pteris aquilina* is to be seen, even with the naked eye, the inner one, except in a peculiar state of the sorus (before it is mature), can only be brought to view by careful dissection under the microscope.* I have however satisfied myself of its existence, though I have often failed to detect it: indeed the fact appears to be ignored by the

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* Its presence was detected by the late Thomas Smith, Esq., of the Temple, London, and communicated to me in 1819, in a letter which I published in the 'Flora Scotica,' and which deserves here to be recorded. He considered this inner involucre (I scarcely know upon what grounds) to be the *real* involucre. "It will be found," he says, "exactly opposite to that which is seen on the edge of the frond, and, between the two, the line of capsules is placed. It may be called the inner involucre, and much resembles the outer, having, like that, a ciliated edge; but, instead of being flat, it curls inwards, covering the capsules in their young state, and being itself covered by the outer one. It is best, perhaps, seen when the capsules are about half ripe, at which time it is nearly the same breadth as the outer one, and is readily seen by the assistance of the microscope. In texture it seems to differ a little from the outer."

"According to the principles upon which genera are formed in this Order, the inner involucrum appears to afford a character which would justify the forming a new genus. I have found it in *Pt. caudata,* which is very nearly allied to *aquilina;* it also occurs in *Pt. esculenta,* and our mutual friend Brown authorizes me to say that it is found in a small group of the genus *Pteris,* the species of which agree in habit, and are mostly extratropical, differing from the tropical species in having a thicker and harder frond, and not a thin filmy one, which exists in most of the latter. It is perhaps not unworthy of remark that this involucrum is never seen, except when there is fructification. The outer one, it is well known, is almost always present, whether there is fructification or not, a circumstance, I believe, which does not generally take place in a true involucrum."—*Smith, in Letter, Aug.* 1819.

Since the above was sent to press, I have been favoured by my friend Mr. Wilson, of Warrington, with excellent magnified drawings of the double involucre both of *Pt.* (Ornithopteris) *aquilina* and *scalaris,* which will occupy Tab. CXLI. (the first plate of our Vol. III.), for they show the nature and structure better than any description of mine can do. I may add here however the following observations of Mr. Wilson:—"The interior (true?) involucre of *Pt. scalaris* is thrice as broad as that of *Pt. aquilina,* and is the more conspicuous from the narrowness of the marginal cover, and the absence of the fringe of ciliary processes; but if smaller in *Pt. aquilina,* it is almost as easily found, from its being coloured. I do not find any interior involucre in the American forms of *Pt. aquilina,* but as it does occur, though not constantly, in *Pt. esculenta,* Forster, I may on a future attempt find some traces even in them."—He has since found the inner cover to exist in several forms of the N. American *Pt. aquilina,* even in specimens on which he had not succeeded in detecting it before; "sometimes being obvious enough in one part, and in another quite obsolete."

most distinguished writers on Ferns. It is however figured by Mr. Jenner (woodcut) in Mr. Newman's 'History of British Ferns,' p. 31, and the latter author has suggested the formation of a genus under the name of *Eupteris*. I have recently, and, I am sorry to say, since the execution of the plate where a figure of the species is given, detected a double involucre in an allied species (*Pt. scalaris*, Moritz), in which the inner one is, in a certain state of the fructification, as much developed as the outer, so that I do not hesitate to consider it characteristic at least of a group of my section *Eupteris*.)

64. Pt. (Ornithopteris) *aquilina*, L.; caudex running long and deep underground, stipites erect remote stramineous or tawny, fronds ample subdeltoid coriaceous tripinnate glabrous or hairy beneath, primary divisions long-petiolate, ultimate pinnæ sessile, pinnules spreading linear more or less approximate entire or hastate or below deeply pinnatifid sometimes to the apex, segments ovate or oblong or linear upper ones decurrent at the base the confluent portion sometimes forming a lobe or auricle, ultimate segments often elongated the margins closely reflexed more or less crenulated, veins approximate simple or forked, involucre double continuous membranaceous more or less villous or ciliated (inner one sometimes obsolete).

α. glabra; fronds destitute of pubescence or but slightly downy beneath.—Pt. aquilina, *Linn. Sp. Pl. p.* 1533. *Sw. Syn. Fil. p.* 100. *Willd. Sp. Pl.* v. *p.* 402. *Ag. Sp. Gen. Pterid. p.* 49. *Engl. Bot. t.* 1679. Allosorus aquilinus, *Pr.* Pt. caudata, *Schkuhr, Fil. t.* 95 *et* 96. *Hook. et Arn. Bot. of Beech. Voy. p.* 455 (*non Linn.*). Pt. recurvata, *Wall. Cat. n.* 113. *Ag. Sp. Gen. Fil. p.* 50. Pt. firma, *Wall. Cat. n.* 100. Pt. excelsa, *Bl. En. Fil. Jav. p.* 213 (*fide Ag.*), *not Gaud.* Pt. latiuscula, *Desv.*

β. lanuginosa; fronds evidently pubescent or silky-tomentose beneath, pinnules more generally and regularly pinnatifid rarely caudate.—Pt. lanuginosa, *Bory, in Willd. Sp. Pl.* v. *p.* 403. *Kaulf. Enum. p.* 189. *Ag. Sp. Gen. Pterid. p.* 51. Pt. Capensis, *Thunb. Cap. Prodr. p.* 172. *Sw. Syn. Fil. p.* 393. *Schlecht. Fil. Cap. p.* 45. *t.* 26. *Kaulf. Enum. p.* 186. *Kze. Pl. Ecklon. p.* 47. Pt. lanuginosa, *β*, *Ag. l. c. p.* 51. Pt. decomposita, *Gaud. Voy. Freyc. Bot. p.* 393. *Ag. l. c. p.* 52.

γ. caudata; pinnules and their segments especially the terminal ones narrow-linear elongated obtuse entire or hastate rarely pinnatifid, superior ones often decurrent but not forming lobes on the rachis, involucres almost meeting at the back which is glabrous.—Pt. caudata, *Linn. Sp. Pl. p.* 1533.

Jacq. Collect. p. 273. *Jacq. Ic. Rar. t.* 645 (*excellent*). *Sw. Syn. Fil. p.* 101. *Willd. Sp. Pl.* v. *p.* 401. *Ag. Sp. Gen. Pterid. p.* 48.—*Plum. Fil. t.* 29. *Sloane, Hist. Jam.* i. *p.* 101. *t.* 63.

δ. *esculenta;* pinnules remote narrow-linear superior ones chiefly decurrent and more or less confluent, the decurrent portion forming a shallow rounded lobe or auricle (the segment of a circle), fronds generally quite glabrous.—Pt. esculenta, *Forst. Prodr. p.* 79. *Plant. Escul. p.* 74. *Sw. Syn. Fil. pp.* 101 *and* 296. *Schkuhr, Fil. t.* 97. *Labill. Nov. Holl.* ii. *p.* 95. *t.* 244. *Willd. Sp. Pl.* v. *p.* 401. *Br. Prodr. Fl. Nov. Holl. p.* 154. *Bl. En. Fil. Jav. p.* 214. *Ach. Rich. Fl. Nov. Zeal. p.* 79. *Endl. Prodr. Fl. Norfolk. p.* 12. *Ag. Sp. Gen. Fil. p.* 47. Pt. aquilina, *var.* esculenta, *Hook. fil. Fl. Nov. Zeal.* ii. *p.* 25. Pt. semihastata, *Wall. Cat. n.* 102. *Ag. Sp. Gen. Fil. p.* 48. Pt. densa, *Wall. Cat. n.* 99. Pt. lorigera, *Wall. Cat. n.* 103. Pt. arachnoidea (*rachis and costa downy beneath*), *Kaulf. En. Fil. p.* 190. *Kze. Syn. Pl. Pœp. p.* 76. *Ag. Sp. Gen. Fil. p.* 46.*

Hab. Found, in one or other of its forms, in both hemispheres, in almost all the tropical and temperate parts of the world, in the New as well as the Old, from Lapland, in about 67° N., where it is very rare (*Wahlenberg*), to Akaroa, in New Zealand. Without repeating several stations given by Agardh, I shall offer the following from my herbarium, together with brief notices on any peculiar varieties.

α. *glabra;*—the common form abounds in Europe and North America and Northern Asia, where it is generally glabrous; in the Scottish Highlands, found at an elevation on the mountains of nearly 2000 feet above the sea-level, and there attaining a height of 5–6 feet in sheltered situations. Altai, *Ledebour.* Avatshka Bay, Kamtschatka, *Seemann* (pinnæ and segments, like some of the North American forms). Messina, Madeira, Cape of Good Hope, where, however, the more common form is our var. β; *Macgillivray and Milne* send specimens from Table Mountain, with small, obtuse, pinnatifid, sterile pinnules, well represented in Schkuhr, Fil. t. 96 a. Hongkong, *Champion*, common; with larger pinnules and segments from Chusan, *Dr. Alexander*, and South China, *Seemann, n.* 2390, *Beechey.* Isle of Pines, *Macgillivray, Milne.* Java, *Millett* (Pt. excelsa, *Bl.*). North America, two forms: 1, the ordinary form, Canada, *Mrs. Shepherd, Pursh;* Massachusetts, *Boott;* Kentucky, *Short:* and a larger variety, with numerous distinct and frequently entire submembranaceous pinnules, the terminal one very long and caudate, all broad; Canada, *Pursh, Mrs. Percival;* Boston, *Boott;* New Jersey, *M'Nab;* Kentucky, *Dr. Short;* New York and New Jersey, *Dr. Torrey;* New Orleans, *T. Drummond* and *Teinturier;* some of the entire and hastate pinnules and some of the terminal lobes are three inches long (Professor Agardh has named these in my herbarium *Pt. Novæ-Angliæ*, Bory, MS.); St. Louis, Missouri, *Dr. Engelmann.* South America: Boquete, Veraguas, and Sierra

* Other synonyms might be added, if it were worth encumbering our pages with them. Presl has in this group his *Allosorus villosus, A. Hottentottus, A. Tauricus;* Fée a *Pt. villosa*, which Mr. T. Moore refers hither ("excluding *Cuming, n.* 408"), etc. etc. Mr. Moore has twenty synonyms under the European *Pt. aquilina*, without taking into account *Pt. esculenta, caudata*, etc., of authors!

Madre, *Seemann;* Guatemala, *Skinner*, common European forms; Pernambuco, Brazil, almost every pinnule regularly pinnatifid, as is so common in the var. *β*, but quite glabrous.

β. lanuginosa;—has probably a more extended range than *α*, especially in warm countries. Braemar, Scotland, *A. Croal*, in every respect (except in being less luxuriant) resembling the more common tropical form of this var.; that is, nearly all the pinnules regularly pinnatifid, and very villous beneath. Gottland, Sweden, *P. C. Afzelius* (Pt. aquilina, *var.* pubescens, *Afz. fil. in Herb. Nostr.*). Madeira, *Macgillivray and Milne.* Teneriffe, *Bourgeau.* Tauria, *Fischer.* Algeria, *Herb. Nostr.* Senegambia, *Heudelot, n.* 883. Fernando Po, *Dr. Vogel, in Capt. Trotter's Niger Expedition*, and *Barter, in Baikie's Second Niger Expedition;* pinnules remote, elongated, but not entire, rachises slightly rough, and more or less shaggy with rufous woolly hair. South Africa, most abundant, received from almost every traveller in the Cape, and of various forms, generally resembling our common European *Pt. aquilina* in ramification, *Drége* (Pt. Capensis, *Th.*, *a* and *c*); some, especially from *Armstrong*, quite rusty beneath, from the masses of fructification; and very compact, with close-placed pinnules and segments; Macalisberg, *Dr. Sanderson* (common form of *Pt. aquilina*). Abyssinia, northern side of mountains 8000–9000 feet elev. above the sea, near Genansa, *Schimper, Iter Abyssinicum, n.* 1322 (named *Pt. Capensis*, Thunb. = *Pt. lanuginosa, b*, J. Ag.) and *n.* 856. India, almost universal: Madras Peninsula, *Wight, n.* 89; Cochin, *Rev. E. Johnson*, small, and very thin and membranaceous, with narrow and imperfect involucres; Mahalableshwar, *Colonel Bates;* Nilagiri, *Hohenacker, Gideon Thomson, Dr. Schmidt;* Dindhighul (*Wallich*), *n.* 2178 (*Pt. Wightiana*, Wall.); Concan, *Law;* Khasia, *Simons, Hooker fil. and Thomson, n.* 561, alt. 2–3000 feet; Northern India: Sikkim, subtropical region, Kumaon, *T. Thomson.* Nepal and Sylhet, *Wallich, Cat. n.* 101; Pt. terminalis, *Wall.*, and *n.* 113 (Pt. recurvata, *Wall.*), *Griffith.* Gurhwal, etc., elev. 7500–9000 feet, *Major Madden, R. Strachey, and J. E. Winterbottom.* Mauritius, *Wallich, n.* 98 (Pt. lanuginosa), and Bory in Sieber, Syn. Fil. n. 76, *Gardner, Bojer, Bouton;* Bourbon (*from Herb. Mus. Par.*). Penang, *Lady Dalhousie.* Luzon, n. 100, and Isle of Bohol, n. 353, *Cuming, Gaud.;* Sandwich Islands, Oahu, *Seemann, n.* 1704. N.W. America, common from Cape Mendocino to Puget Sound, and in the interior of the Columbia, *Douglas.* Jamaica (*H. Shepherd*).

γ. caudata;—West Indies: St. Domingo, *Plumier;* Cuba, *Pœppig, E. Otto, n.* 331, *Linden, n.* 1861; Jamaica, *Wiles, Capt. Finlay:* Venezuela, *Funck and Schlim, n.* 983 (with many of the superior pinnules strongly decurrent, and bordering close upon the following var., *Pt. esculenta*), but the decurrent bases do not form lobes.

δ. esculenta;—very abundant in the southern hemisphere.—Woods of the Society Islands, *G. Forster* (original specimen in my herbarium, which being slightly downy on the costa beneath is marked by Agardh as *Pt. arachnoidea*). N. Zealand, most abundant, *Fraser, A. Cunningham, Colenso, Sinclair, J. D. Hooker;* Hoenaki Gulf, Akaroa, *Dr. Lyall* (one young specimen is quite clothed with rich ferruginous down). Australia, chiefly in the south, Sydney, *Sieber, R. Brown, J. D. Hooker*, etc.; Argyll County, *All. Cunningham;* Victoria, *Mueller, Robertson, Adamson;* Flinders Bay, *Collie.* Tasmania, *Labillardière, R. Brown, Lawrence, J. D. Hooker, All. Cunningham*, etc. Norfolk Island, *Allan Cunningham, Dr. Falconer, V. Thompson, C. J. Simmons.* Raoul and Kermadee Isles, *J. Macgillivray, n.* 943, *Milne, n.* 71. Feejee Islands, *Dr. Harvey.* Tropical America: Jamaica, *Lunan* (on the authority of Agardh). Venezuela, *Moritz, Fil. n.* 49 (Pt. caudata, *L.*), *Fendler, n.* 104. Boquete, Veraguas, *Seemann, n.* 1557. Guiana, *Leprieur, C. S. Parker.* Galapagos, *Capt. Wood, R.N.;* Peru, *Pœppig* (Pt. arachnoidea, *Kze.*). Brazil, abundant, *Gaudichaud, Sellow, Gardner, n.* 2988, Santa Rosa, and Minas Geraes, *n.* 5303; Pará, *Spruce, n.* 32 and 381, *Martius* ("Pt. campestris, *Schrad.*"), *Milne and*

Macgillivray. India, apparently rare on the continent; Kumaon, *R. Blenkworth, Wall. Cat. n.* 103 ("Pt. lorigera, *Wall.*"), pinnæ and pinnules very wide apart and very obtuse. Singapore, *Wall. Cat. n.* 102 ("Pt. semihastata, *Wall.*"); Penang, *Wall. Cat. n.* 99 ("Pt. densa, *Wall.*"). Borneo, *Motley;* Indian Archipelago, *Seemann, n.* 2309.

Every one is familiar with the common Brakes (*Braken*, Scoticè) of our hills and woods, *Pteris aquilina*, Linn., which I consider, in a more less varied form, to be found almost all over the world. The figure, by "Nature-printing," as given in 'The Ferns of Great Britain and Ireland, by Thos. Moore,' Tab. XLIV., we need not say, *accurately*, represents the normal state of a moderately sized specimen of this plant; and it will there be seen that the upper portion of the frond has the pinnules more elongated, narrow and entire, while those of the lower part are all (except those at the very apex of the pinnæ) very regularly and equally pinnatifid for the whole length. Sometimes, however, the elongated and simpler form of the pinnules is more prevalent; they are placed more apart, the terminal ones are peculiarly elongated and contracted, whence arose the *Pt. caudata* of authors; sometimes nearly the whole plant is made up of the more closely placed and more uniformly pinnatifid pinnules, and these are frequently, especially in warm countries, more or less villous or woolly beneath, and thence we have the *Pt. lanuginosa*, Bory; this is rare in, but not wanting to, the temperate parts of Europe; and, lastly, the *esculenta*-form presents, particularly in the southern hemisphere, another feature—those distantly placed and mostly terminal pinnules which have a decurrent base expand there into a lobe (the segment of a circle), forming an auricle or wing-like appendage to the rachis. With almost innumerable suites of specimens before me, there are so many intermediate grades that I find it in vain to attempt to distinguish them as species. No doubt many will be surprised to be told that our common *Brake* is the same genus and species as the famous *edible Fern* of the South Sea Islanders, but an intelligent and scientific gentleman has recently brought the esculent properties of our *Pteris aquilina* to public notice, and has himself luxuriated upon this vegetable.*

64. Pt. (Ornithopteris) *coriifolia*, Kze.; frond coriaceous glabrous shining paler beneath oblong acuminate tripinnate, pinnæ and lower and middle primary pinnules exceedingly remote (*remotissimis longe*), uppermost ones petiolate approximate at length confluent all of them patent oblong acuminate flexuose or curved, secondary pinnules (*pinellæ*) sessile divergent ovato-oblong obtuse subauriculate, lowest ones especially above abbreviated, all of them slightly pinnatifid, segments ovato-rotundate slightly crenulate beneath with elevated forked veins, the sinuses rounded, sori continuous occupying from the base to the apex of the frond, rachises and stipes short thickened at the base rufo-tomentose flexuose angular rufescent. *Kze. in Linnæa*, xviii. p. 120.

Hab. Cape of Good Hope, *Gueinzius.*—"Planta distinctissima e sectione Aghardiana *Ornithopteridis*, affinis aliquo modo *Pt. Capensi* (our *Pt. aquilina*, β.) s. *Pt. consobrinæ* meæ (*Pellæa*, nobis), imprimis sterili nec vero fronde glauca et

* See Dr. Benjamin Clarke, F.L.S., "On *Pteris aquilina* as an Esculent Vegetable," in Hook. Journ. of Bot. vol. ix. p. 212.

opaca, sed olivaceo-viridi, subtus pallidiore et insigni modo nitidula, rachesque non ebeneæ seu atro-purpureæ, validæ, sed luride rufescentes graciles."—Kunze had seen but one specimen, and it were to be wished he had been more explicit as to its distinctness from the *Pt. Capensis* of Thunberg and Schlechtendal, for the differences he mentions are in contrast with *Pellæa consobrina*, Kze.

65. Pt. (Ornithopteris) *psittacina*,* Pr.; "fronds ovate tripinnate, pinnæ subopposite, pinnules adnate lanceolate rugose ciliate, inferior ones of the lowest pinnæ inciso-serrate, rachises pubescent, stipes angled."—*Pr. Delic. Prag.* 1822, *p.* 185. Allosorus psittacinus, *Pr. Tent. Pteridogr. p.* 153. *Ag. Sp. Gen. Pterid.* (*in note*), *p.* 47.

Hab. Rio Janeiro, *Presl.*—The author places this next to *Pt. aquilina* in his 'Pteridographia,' and that is all we know of its affinities.

66. Pt. (Ornithopteris) *scalaris*, Moritz; straggling subscandent caudex very long creeping villoso-paleaceous, frond decompound (young plants quite glutinous) repeatedly pinnate everywhere clothed with glandular viscid rufous hairs, primary pinnæ 2 feet and more long the branches flexuose intricate, but they and the subdivisions and even the pinnules distant from each other coriaceous rigid, ultimate pinnules from ½ to an inch in length ovate subacute or deltoid-oblong sessile pinnatifid in the lower half ovate, veins sunk obsolete, involucres double, outer formed of the membranaceous dilated recurved margin of the frond continuous round the lobes and to the apex, inner membranous as large as the outer, stipes and very flexuose rachis ferruginous glanduluso-villous. (Tab. CXXI. B.;—and Tab. CXLI. C. in Vol. III.)—*Moritz, Fil. Venezuelæ, n.* 399, *in Herb. Nostr., name only.* Pt. glutinosa, *J. Sm. MS.*

Hab. High mountains of Jamaica, *Wiles, Macfadyen;* Venezuela, Colony of Tovar, *Moritz, Fendler, n.* 94.—This very remarkable Fern, which, since my first knowledge of it, I had no hesitation in referring to the *Aquilina* or *Ornithopteris* group, has been hitherto only found in Jamaica and Venezuela. Fine specimens are in my herbarium from Dr. Macfadyen, and Mr. J. Smith's collection contains equally perfect ones from Mr. Wiles, who has accompanied

* This and the preceding species and the *Pt. Feei* of Schaffner, may probably be considered as belonging to *Pt. aquilina;* but I cannot speak of them on any authority, having never seen specimens.—"Pt. (Aquilinæ) *Feei*, Schaffn.; stipe et rachis jaunâtres, port et dimensions du *Pt. aquilina*, L., lames tomenteuses minces en dessous, glabriuscules en dessus, à segments fructifères complétement envahis par les sporothèces, lesquels pour s'unir, semblent descendre jusqu'au fond du sinus, sporanges dorés, nervilles nombreuses et très-serrées. *Fee, Fil.* 8*me Mém. p.* 73. Hab. Mexico, near Huatusco, *n.* 138 and 144, and at Popocapetl, *n.* 186, *Schaffner.*—Dimensions inférieures à celles des *Pt. aquilina*, L., et *lanuginosa*, Bory; le stipe, tomenteux à la base, ne présente dans sa coupe aucun arrangement comparable à celui du *Pt. aquilina.*" *Fée.*

them with the following remarks:—"Fronds more than decompound, forked branching. Stipes round, ferruginous, rather hispid. Segments of the fronds irregularly cut (small), round at the top, terminal lobe larger. Fructification in short lines around the margins of the lobes and teeth of the leaflets. A straggling, running, spreading rough species, found only on high mountains." I should much have preferred Mr. J. Smith's appropriate name of *glutinosa;* but the more recent one of Mr. Moritz has derived publicity from being issued with his 'Filices Venezuelæ,' *n.* 399. I am indebted to Mr. Steetz, of Hamburg, for my specimen of this. It is a very young one (yet bearing perfect fructification), and gives no idea of the size and extent and compact and entangled flexuose branches of our Jamaica specimens. Fendler's specimen is very perfect, though small; it has, however, the advantage of possessing both stipes and caudex, and it is from the Venezuelan plant that our drawing (Tab. CXXI. B.) is made. In one instance, in our Jamaica specimens, the singularly flexuose rachis is as thick as a goose-quill. The existence of the double involucre in this species (which I did not detect till after the plate was engraved, or a magnified figure would there have been given) is confirmatory of its belonging to this *Aquilina* group of *Pteris*.

While we were only acquainted with the very obscure inner involucre of *Pt. aquilina*, we were content to let it remain in the genus *Pteris;* but now that we find in an allied species an inner involucre as fully developed as the outer one, which is really the case, it presents a character in the fructification quite at variance with *Pteris*, differing from *Lindsæa* only in this double involucre being reflected upon the back of the pinnule, consequently not opening outwardly, but towards the costa. Its natural place is with *Pteris*, where for the present I retain it, only observing that if deemed necessary to constitute a distinct genus, the name *Ornithopteris* (Ag.) seems unexceptionable.

§ Heterophlebium.—*Veins close, parallel, dichotomous, free near the costa, anastomosing only towards the margin; fronds pinnate.*—Gen. Heterophlebium, *Fée.* Litobrochia, *J. Sm. T. Moore.*

Obs. *Heterophlebium* is to *Pteris* what *Hemidictyon* is to *Asplenium* in that group of Ferns, and equally deserving of constituting a distinct genus; yet Presl and J. Smith and T. Moore decline to adopt it. Presl even maintains it in *Pteris*, if his *Pt. grandifolia*, L., be really Linnæus's plant.

67. Pt. (Heterophlebium) *grandifolium*, L.; frond ample lanceolate pinnate glabrous, pinnæ sessile or nearly so numerous lanceolate elongated acuminated entire firm-membranaceous satiny especially beneath obtusely cuneate at the base, veins close parallel simple or forked below uniting and anastomosing only towards the margin, rachis and long stipes pale straw-colour. (Tab. CXIII. B.)—*Linn. Sp. Pl. p.* 1531. *Sw. Syn. Fil. p.* 95. *Willd. Sp. Pl.* v. *p.* 369. *Presl, Tent. Pterid. p.* 145. *Ag. Sp. Gen. Pterid. p.* 7. Pt. vittata, *Schkuhr, Fil. t.* 89? (*venation incorrect*) *not Linn.* Litobrochia grandifolia, *J Sm. En. Kew Ferns, p.* 16. *T. Moore, Ind. Fil. p.* xliv. Litobr. ampla *and* Litobr. Schiedeana, *Presl, l.c. p.* 148 (*according to his definition of the group or section in which he has placed them*). Heterophlebium grandifolium, *Fée, Gen. Fil. p.* 139. *t.* 11 A. *f.* 9, 12.—*Plum. Fil. t.* 105. *Sloane, Jam. t.* 40.

Hab. Tropical America, West Indian Islands, *Swartz, Plumier, etc.* Venezuela, *Fendler, Pl. Venez. n.* 96. New Granada, *Birschel, Holton, Fl. Neogr. Magdal. n.* 57. Mexico, Ficaltepec ad Rio Nautla, *Liebmann, in Herb. Nostr.*— A very fine and very distinct species, if only the venation be attended to; in other respects it bears a close resemblance to *Pteris* (Eupteris) *Moluccana*, supra, p. 158, and *Pt. opaca*, l. c. See our respective figures, Tab. CXII. B., Tab. CXIII. B., and Tab. CXIV. A. I am indebted to Sir Henry Barkly, while Governor of Jamaica, for a singular abnormal state of this Fern, having several of the pinnæ deeply yet unequally lobed, sometimes down to the costa, and others forked and even bifurcate, with the segments divaricated.

§ CAMPTERIA.—*The lowermost opposite costal veins (or veinlets) meeting, uniting, and forming a series of areoles ("arcs" or arches,) next the costa of the pinnæ (giving out other veinlets), the rest free, simple or forked.*— Gen. CAMPTERIA, *Pr. Tent. Pterid. t.* 5. *f.* 19, 26. *Hook. Gen. Fil. t.* 264, 265 A.)

OBS. The advocates for deriving generic characters of Ferns mainly from differences in venation, are at variance respecting the genus *Campteria*. Presl and Moore consider it, in the Pterideous group, to be analogous to *Hemistegia* among *Cyatheæ*, *Pleocnemia* among *Aspidieæ*, *Digrammaria* among *Asplenieæ*, *etc.*: and so far they are consistent. Mr. J. Smith and M. Fée on the other hand unite it with *Litobrochia*, the former without even making a section of it, the latter considering it a subgenus. As defined by the author (Presl), the series of arched veins are confined to the costa or midrib of the pinnæ, not extending to the costa or main central vein or costules of the segments (see his figures in Tent. Pterid. t. 5. f. 19 and 26);— but in some species of our *Pteris* similar areoles or arches exist also in the costules of the segments while the other veins are free. Such we have referred to our § *Litobrochia*. The character indeed here taken from the veins is wholly artificial; it is unaccompanied by any other peculiarity of form or structure, insomuch that the most able botanists have, till the venation was considered, been at a loss to distinguish between *Pteris nemoralis* and *Pt. biaurita* and *Pt. quadriaurita*: nay, it will be seen that our very first species of this section has the veins in question, which should be united to form a *Campteria*, sometimes also free in one and the same specimen. (See too our remarks under § *Litobrochia*.)

(*Pinnate, with the lower pinnæ bifid and even again pinnate or bipinnate; pinnules pinnatifid.*)

68. Pt. (Campteria) *nemoralis*, Willd.; fronds generally ample subcoriaceo-membranaceous pedately ovate pinnate, pinnæ subsessile lanceolate acuminate, lowest pair tripartite or again pinnate all of them deeply pinnatifid (leaving however as it were a broad wing on each side the costa), segments oblong or linear-oblong obtuse entire scarcely falcate, basal veins free and extending to the sinus (§ *Eupteris*) or the lowest opposite pair meeting and uniting below the sinus forming areoles or arches (§ *Campteria*) and then bearing 3 or 4 free veinlets which extend to the margin at and above the sinus, stipes and rachises stramineous or pale brown.—"*Willd. Sp. Pl. p.* 386, *in part. Decaisne, Hb. Timor. p.* 20, *excl. syn. Bl. Wall. Cat. n.* 106, 9, 10, *quoad partem*, 12" (*Ag.*). *Ag. Sp. Gen. Pterid. p.* 25, *et in Herb. Nostr.* "Pt. Plumierii,

Willd. En. p. 462. Pt. biaurita, *Kze. Acotyl. Afr. Austr. p.* 436, *et var.* edentula, *Kze. Syn. Pœpp. p.* 75" (*Ag.*). Campteria Rottleriana, *Presl, Tent." Pterid. p.* 147. t. 5. *f.* 26.

Hab. Agardh gives "East India, China, Ceylon, Bourbon, Guinea, Congo (*Ch. Smith*), Cayenne, Brazil," etc., as localities. My own herbarium only exhibits specimens from E. India, *Wallich*, 1820, mixed with undoubted *Pt. quadriaurita*. Bourbon, *Capt. Carmichael* (named by Agardh); China, Macao, *Rev. G. H. Vachell* (named by Ag.); Ceylon, *Gardner, n.* 1331 (frond 2 feet long, more coriaceous substance opaque dark brown almost black when dry); Sierra Leone, *Barter, in Baikie's 2nd Niger Exped.* (1857); one specimen, gathered at the same time and place, has the lower pinnæ pinnate and bipinnate.—Thanks to the investigations of Professor Agardh in the genus *Pteris*, he has thrown much light on the vexed question of the identity of *Pt. quadriaurita*, Retz, *Pt. nemoralis*, Willd., and *Pt. biaurita*, L. All three are liable to similar variations as to size, and the composition of the lower ramifications or pinnæ,—yet all have the same uniform aspect and general outline; and, as far as has been possible, he has consulted authentic specimens in their determination. The result is that *Pt. quadriaurita* has entirely free venation (§ *Eupteris*); *Pt. nemoralis* * vacillates between sections *Eupteris* and *Campteria*, having on the same plant partly the free venation of one, and partly the united basal veins on the segments of the other: and here I must leave it to others to determine how far it deserves the rank of a species; and if not, whether it should be transferred to *Pt. quadriaurita* or to the *Pt. biaurita*, which latter has the perfect venation of *Campteria*, and which we shall consider under our next number.

Agardh has described the present species to be equally widely diffused with *Pt. biaurita:* but at the time he was engaged upon his 'Recensio Specierum Pteridis' he was only able to find in my herbarium two samples, which he named *nemoralis*, and I have since only been able to add two more localities.

69. Pt. (Campteria) *biaurita*, L.; fronds generally ample subcoriaceo-membranaceous pedately ovate pinnate, pinnæ subsessile lanceolate acuminate lowest pair bi-tripartite or again pinnate mostly downwards, all the pinnæ deeply pinnatifid (leaving however a broad wing on each side the costa), segments oblong or linear-oblong obtuse entire scarcely falcate, basal veins uniting in pairs into an arch below the sinus and then bearing 4–6 or 8 simple veinlets which extend to the margin at or above the sinus, stipes and rachises straminеous smooth.—" Pt. biaurita, *Linn. Sp. Pl. p.* 1534, *nec Sw.* (*Ag.*) *Willd. Sp. Pl.* v. *p.* 386, *in part. Bl. En. Pl. Jav. p.* 210. *Belang. Voy. p.* 42. *Wall. Cat. n.* 100, *in part*

* Agardh's observations upon the *Pt. nemoralis*, Willd., deserve to be here recorded:—"A sequente (*Pt. biaurita*) nonnisi venarum structura differre videtur. Venæ basales nunc omnino discretæ et ad ipsum sinum excurrentes, nunc ex laciniis adjacentibus infra sinum obviæ, et ramis furcæ inferioribus sese *tangentibus vel immo in unum coalescentibus, arcum*, minus tamen quam in sequente specie, regularem, formantes."

(fide spec. in Hb. Soc. Linn.)." Ag. Sp. Gen. Pterid. p. 26. Campteria biaurita, *Hook. Gen. Fil. t.* 75 A. C. Rottleriana, *Presl, Pterid. t.* 5. *p.* 26? Pteris geminata, *Ag. Sp. Gen. Pterid. p.* 31. Pt. Kleiniana, *Presl, Tent. Pterid. t.* 5. *f.* 19 (*Agardh*).—*Plum. Amer. t.* 14. *Fil. t.* 15.

Hab. The following localities are entirely from our own herbarium. East Indies: Kumaon, *Blinkworth, Strachey and Winterbottom;* Nepal, *Wallich, J. D. Hooker;* Sikkim, 1–4000 ft., *J. D. H.;* Assam, *Griffith;* Khasia, *Griffith,* 2000 ft., *J. D. H.;* Silhet and Chittagong, *Hooker, Thomson, and Griffith;* (*Dr. Hooker and Dr. Thomson's specimens distributed are n.* 148–9). Ava and Penang, *Wallich;* Concan, *Mr. Law;* Nilgiri, *Gid. Thomson, M'Ivor.* Ceylon, *Gardner, n.* 1130, 1240, 1128. Bourbon (*Herb. Mus. Par.*); Mauritius, *Bojer;* Java, *Millet;* Tropical Western Africa, *Dr. Curror;* Fernando Po, *Dr. Vogel.* West Indies: Antigua, *Dr. Nicholson,* segments narrow distant; Guadaloupe, *L'Herminier.* Brazil, Arayos, *Gardner, n.* 4076.—Specimens entirely according with the character of this species, I possess, as will be seen above, from much more numerous localities and countries than the preceding one. Its essential character consists in the chain or series of areoles, more or less broad, sometimes very narrow, one between every pair of costules (or midrib of the segments), caused by the meeting of the two basal or inferior veins, forming an arch more or less angled, and which gives out free veinlets or branchlets from the upper side, while the opposite boundary of the areole is formed by the costa. In general the two basal veins spring from the axis or sinus formed by the costule, so that the whole space between the base of the costules is occupied by the areole, but at other times one of the two nerves springs from the costa at a distance from the sinus; then the areole occupies only $\frac{1}{2}$ or $\frac{2}{3}$ of the space between the costules. All the other veins are generally free, rarely and only here and there anastomosing; in such cases indicating a passage to *Litobrochia.* Equally rare is it to find the basal veins free, though not unfrequently they unite in such a manner as to form a very acute angle rather than the curvature of an arch.—Both in this and the preceding species we have, like Agardh, felt it impossible to guess at what authors in general have intended by *Pteris biaurita.*

70. Pt. (Campteria) *Galeotti,* Fée; "fronds pinnated bipartite at the base glabrous, pinnules pinnatipartite pectinated shortly petiolated caudiform at the apex, segments oblong numerous almost all fertile leaving between sinuses which are rounded at the base, basal nervelets uniareolate uniting the segments, indusium straight narrow, sporothecia thick at the maturity of the sporangia."—Litobrochia (§ Campteria) Galeotti, *Fée, Fil. 8me Mém. p.* 75.

Hab. Mexico: Oaxaca and Teotalingo, *n.* 6485, *Galeotti.*—"Large species of the size and with the habit of *Pt. nemoralis,* Willd."

71. Pt. (Campteria?) *amœna,* Bl.; "frond bipinnatifid, pinnæ opposite shortly petiolate lanceolate attenuate at both extremities pinnatifid membranaceous glabrous lowest ones bipartite, segments subfalcato-oblong somewhat acute appresso-serrate lower ones obtuse, stipes and rachis glabrous."—*Blume, En. Pl. Jav. p.* 210. *Ag. Sp. Gen. Pterid. p.* 27, *in note.*

Hab. Shady places, mountains of Java, *Blume.*—"A *Pt. biaurita*, L., differt laciniis serratis intermediis acutis." *Bl.*—Agardh questions if it should not be referred to *Pt. quadriaurita*;—and then it would be of the § *Eupteris.*

72. Pt. (Campteria?) *atrovirens*, Willd.; fronds pinnate, pinnæ subopposite pinnatifid, segments oblong obtuse unequally toothed at the apex, lowest pinnæ bipartite, stipes smooth," *Willd. Sp. Pl.* v. *p.* 385.—*Ag. Sp. Gen. Pterid. p.* 28, *in note.*

Hab. Oware and Benin, western tropical Africa, *Dr. Flügge.*—"Resembling *Pt. biaurita*, but the frond is thicker, more rigid, black-green," and, I think, may safely be referred to *Pt. biaurita*, a very common species in Western Africa.

73. Pt. (Campteria?) *armata*, Pr.; "fronds cordato-ovate glabrous glaucescent pinnate, pinnæ opposite sessile pinnatifid lowest ones bipartite, segments linear obtuse entire unequal, terminal one elongated repand, secondary rachises and costa above spinose, stipes smooth," *Presl, Reliq. Hænk. p.* 56.—*Ag. Sp. Gen. Pterid. p.* 29, *in note.*

Hab. Island of Sorzogon, *Hænke.*—"A *Pt. pungente* diversissima," *Pr.*—Probably this should be referred to the free-veined *Pterides*, and perhaps to *Pt. quadriaurita.*

(*Tri-quadripinnate; primary ramifications ternate.*)

74. Pt. (Campteria) *triplicata*, Ag.; frond bi-tripinnate 1–2 feet long firm-membranaceous, pinnæ ternate and as well as the pinnules long-petiolate, pinnules almost a span long deeply pinnatifid, segments oblong very obtuse or retuse coarsely serrated where sterile, veins forked basal ones united and forming an angular arch between the costules, sori narrow continued to the very apex, stipes channelled smooth.—*Ag. Sp. Gen. Pterid. p.* 29.

Hab. Madagascar, *Goudot, Bernier;* Mozambique, "*Forbes, in Herb. Hook.*"—A very distinct and remarkable species, especially in the disposition of the primary pinnæ to ramify in a ternate manner; the pinnæ and pinnules are long-petiolate. The longest pinnules are nearly a span long; all are lanceolate, pinnatifid, with an elongate terminal segment, serrated where destitute of fructification. The lateral segments or lobes are an inch and a quarter long, ⅓ of an inch broad, singularly obtuse or even retuse. The sori are copious on almost every segment and extending to the apex. The involucre is of a firm texture, very narrow, dark brown.

75. Pt. (Campteria) *Pseudolonchitis*, Bory; "fronds bipinnate, lowest pinnæ bipartite and as well as the pinnules pinnato-partite, segments serrated, those of the pinnæ lanceolate acuminate, of the pinnules oblong obtuse, primary veins monarcuate, secondary ones and veinlets all forked," *Ag.* —*Bory, MSS. Willd. Sp. Pl. p.* 389. *Poir. Encycl. Méthod.*

iv. *p.* 605. *Bélang. Voy. p.* 43. *Ag. Sp. Gen. Pterid. p.* 39. Campteria Pseudolonchitis, *Presl, Tent. Pterid. p.* 147.

Hab. Bourbon, *Bory;* Madagascar, *Goudot (Bory).*—"Stipes glabrous. Fronds 2 feet long, bipinnate. Lowest pinnæ bipartite, the next above 3–4-pinnulate; upper ones and pinnules sessile or adnate, 3–7 inches long, an inch broad, pinnato-partite. More adult or terminal segments of the pinnæ lanceolate, subdecurrently confluent; younger ones or those of the pinnules more oblong or obtuse. Basal veins all meeting so as to form arches between the costules; secondary ones and veinlets forked or simple, free," *Ag.*—Agardh, who has given his description from authentic specimens, places this species between *Pt. Cræsus*, Bory, and *Pt. tremula*, Br., both of the section *Eupteris;* but as the venation is clearly that of a *Campteria* with compound fronds, I venture to place it here.

76. Pt. (Campteria) *Wallichiana*, Ag.; frond ample glabrous submembranaceous 3-partite, lateral branches compoundly divided terminal one elongated pinnated, pinnæ numerous sessile 4–6 inches long linear-lanceolate acuminate deeply pinnatifid, segments linear-lanceolate obtuse, sterile ones serrulate all approximate about ½ an inch long, basal veins monarcuate the rest free and forked rarely a solitary areole at the base of the costule, stipes very long 5–6 feet stout rich castaneous and as well as the paler-coloured rachises very smooth and glossy.—*Ag. Sp. Gen. Pterid. p.* 69. Pt. umbrosa, *Wall. Cat. n.* 109 (*not of Br.*). Pt. pellucens, *Ag. Sp. Gen. Pterid. p.* 43? Pt. connexa, *J. Sm. Kil. Philip. in Hook. Bot. Journ.* iii. *p.* 405 (*name only*). Pt. pectinata, *Don, Prodr. Fl. Nepal. p.* 15? (Agardh refers to this *Pt. aspericaulis*, Wall., which is however a slight var. of *Pt. quadriaurita*).

Hab. East Indies: Kumaon, *Blinkworth, in Wall. Cat. n.* 109 (*Herb. Nostr.*), *Strachey and Winterbottom;* N. W. India, *Edgeworth;* Gurhwal, *T. Thomson* (*n.* 1256); Sikkim, *Hooker and Thomson, n.* 146 a, and 150 b; Khasia, *Hooker and Thomson, n.* 150 d, *Griffith, Simons.* Luzon, *Cuming, n.* 204, *Thos. Lobb, n.* 481.—It was no doubt the striking resemblance of this Fern to *Pt. tripartita*, Sw., which induced Agardh to place it in his § *Litobrochia;* so striking in fact that I know no character by which it can be distinguished from that species, save by its almost entirely free venation; for if there is now and then seen a solitary anastomosing of the veins beyond that of the basal ones, it is by no means the normal condition of the plant. It is as much a *Campteria* as *Pt. biaurita.* The great size of the frond, however, the compound ramification, the comparatively small size of the pinnules, and the very numerous short and approximate segments, readily distinguish it. Mr. J. Smith is of opinion that the *Pt. pectinata* of Don is the same as this; and also the *Pt. pellucens* of Ag. (see p. 191): but the description of the venation of the latter shows that that is of the section *Eupteris*, or it may, like *Pt. nemoralis*, exhibit the venation sometimes of *Eupteris* and sometimes of *Campteria.*

(*Species and its affinity unknown to me.*)

77. Pt. (Campteria) *Gardneri*, Fée; "fronds divided, ra-

chis rufescent channelled beneath glabrous, pinnules very long-petiolate subpinnate caudate pectinated, segments horizontal divided to the costa linear thick crenulate obtuse repand the sinus broad the apex sterile the base dilated, basal areoles very narrow difficult to be seen indicated at the mesoneure by a rima, sporothecia thick, indusium rather broad, the margin receptaculiform, sporangia ovate on a slender pedicel, annulus 16–18 joints trigonous blackish."—Litobrochia (Campteria) Gardneri, *Fée, Gen. Fil. p.* 139.

Hab. Ceylon, *Gardner, n.* 42 (*Herb. Mong.*).—"Large Fern; stipes and rachis reddish; pinnæ very long, remote."

§ LITOBROCHIA.—*Veins uniformly anastomosing, or the areoles, in one or more series, are confined to the costa and costules, the rest of the venation being simple or forked; rarely all are free. Areoles inappendiculate.*—Gen. LITOBROCHIA, *Presl, Tent. Pterid. p.* 148. *t.* 5. *f.* 20, 24, 25. (HOOK. GEN. FIL. TAB. LXV. B.)

Obs. The genus *Litobrochia* is defined by its author, Presl, as having "venæ in maculas hexagonoideas elongatas vel breves anastomosantes." His first section, however, has the anastomosing venation confined to the margin, constituting the Genus *Heterophlebium* of Fée. On the other hand, M. Fée admits into *Litobrochia Campteria* of Presl, which has the basal veins united, the rest free. We shall find, in our present section, that one well-known species (*Pt. incisa*, Th.) unites in itself three kinds of venation, that of true *Pteris*, of *Campteria*, and *Litobrochia*; and other species, alluded to above, present quite intermediate characters:—so that they do not always serve for specific distinction.

(*Fronds simple (undivided), hastate or sagittate or more or less pedate; stipites black-ebeneous, cæspitose, except in* Pt. ludens, *where they arise from a creeping caudex.*—Gen. DORYOPTERIS, *J. Sm.*; *Fée.*—Small coriaceous Ferns, with immersed veins scarcely visible except in very young fronds; with ebeneous stipites. They represent, in *Pteris*, the *Pellæa geraniifolia* and its allies (*fronds more or less pedate*) among the *Pellææ*. Here however there are species with simple fronds or only slightly divided at the base, but in a more or less pedate manner.)

78. Pt. (Litobrochia) *sagittifolia*, Raddi; caudex short thick erect or inclined, fronds fasciculate firm coriaceous a span to a foot long lanceolato-sagittate or hastate acuminate, the deflexed or patent lobes undivided or unequally bipartite, veins everywhere anastomosing with oblong areoles obliquely arranged, sori narrow continuous, stipes and the costa beneath black-ebeneous.

a. sagittata; lobes deflexed undivided.—Pt. sagittifolia, *Raddi, Syn. Fil. Brasil. n.* 106. *Fil. Brasil. p.* 43. *t.* 63. *f.* 1. *Hook. Fil. Exot. t.* 39. Litobrochia sagittifolia, *Pr. Tent. Pterid. p.* 148. Doryopteris sagittifolia, *J. Sm. Cat. Kew Ferns, p.* 4; *Cat. Cult. Ferns, p.* 35. *Fée, Gen. Fil.* 133.

β. hastata; lobes patent undivided or unequally bipartite.—Pteris hastata, *Raddi, Fil. Brasil. p.* 43. *t.* 63. *f.* 2. *Hook. Gen. Fil. t.* 65 *B. f.* 1 (*bipartite lobe only represented, nat. size*).

Hab. Brazil, woods in the Mandiocca Mountains (both varieties), *Raddi;* Rio, *Burchell, n.* 2051, *Gardner, n.* 36.—Var. *β.* Rocks, in shady woods, in the Organ Mountains, *Gardner, n.* 150 *and* 151.—This would seem to be rather a scarce species, judging from the comparatively few specimens we have received: and all are from the vicinity of Rio or from the Organ Mountains. The fronds are from 4 inches to a foot long; the lobes at the base are liable to considerable variation, sometimes deflexed and sagittate, sometimes patent and hastate. In one of our specimens the patent lobes at the base have a slight curvature upwards, are nearly as long as the main portion of the fronds, and are bipartite, the additional lobe (half its size) is strictly deflected so as to be parallel with the stipes.

79. Pt. (Litobrochia) *pedata,* L.; caudex short thick erect or declined copiously rooting, fronds fasciculate when mature coriaceous opaque cordate tripartito-pedate, lateral primary divisions bipartite on the inferior side or on both sides pinnatifid, terminal one pinnatifid generally cuneate and narrowed at the base, the segments with entire lobes or again pinnatifid, ultimate ones oblong with more or less acute sinuses, the margin of the sterile plant crenulated, sori continuous, involucres narrow entire, veins everywhere anastomosing so as to form a network of oblong hexagonal areoles, stipes terete ebony-black hispid at the base.—*Linn. Sp. Pl. p.* 1532. *Sw. Syn. Fil. p.* 105. *Langsd. et Fisch. Ic. Fil. p.* 12 *et* 20. *Willd. Sp. Pl. p.* 358. *Schkh. Fil. p.* 91. *t.* 100. *Raddi, Fil. t.* 65. *f.* 3. *t.* 66 *and* 66 *b. Br. Prodr. Nov. Holl. p.* 155. *Hook. Bot. Mag. t.* 3247, *and Fil. Exot. t.* 34. Pt. palmata, *Willd. Sp. Pl.* v. *p.* 357. Pt. collina, *Raddi, Fil. Bras. p.* 44. *t.* 65. *f.* 1, 2. Pt. varians, *Raddi, l. c. t.* 64. Pt. Mysurensis, *Wall. Cat. n.* 87/4. Pt. polytoma, *Kze. in Linnæa,* xxiii. *pp.* 289 *and* 322. Litobrochia pedata, *Pr. Tent. Pterid. p.* 149. *Moore, Ind. Fil.* i. *p.* xliv. Cassebeera pedata, *J. Sm. Gen. of Ferns, p.* 47, *and En. Ferns in Hort. Kew, p.* 14. Doryopteris pedata, *J. Sm. Cat. Kew Ferns, p.* 4, *and Cat. of Cult. Ferns, p.* 35. *Fée, Gen. Fil. p.* 133. Hemionitis, profunde laciniata, etc., *Plum. Am. p.* 24. *t.* 34. *Fil. p.* 130. *t.* 152.

Hab. West Indies: Jamaica, St. Domingo, Cuba, Martinique, *Plumier, Sloane, Purdie, Pœppig, etc.* Brazil, as far south as Rio Grande, *Raddi, Swainson, Sellow, Gardner* (gigantic specimen, Rio, *n.* 37, Organ Mountains, *n.* 5030), *Macgillivray and Milne* (*in Denham's Voyage of H. M. S. Herald*), *Burchell, etc., Fox, Tweedie.* Island of Trinidad, S. Atlantic Ocean, *J. D. Hooker, n.* 214. Peru, Chacapoyas, *Mathews, n.* 3292. Columbia, *Hartweg, n.* 1490. New

Granada, *Holton* (Ocaña, elev. 4000 ft.), *Schlim*, *E. Otto*, *Purdie* (*large specimens*). Venezuela, *Fendler*, *n.* 91. Galapagos, *Cuming*, *n.* 107, *Capt. Wood*, *R.N.*, East Indies, Mountains of Dindighul (*ex Herb. Wight*), included in *Wall. Cat. n.* 87/4, and mixed with *Pellæa geraniifolia*; Nilghiri, *Rev. E. Johnson*. Tropical New Holland, *Brown*.—A well-known and very variable Fern, and so closely allied in form and general appearance to the more compound state of *Pellæa geraniifolia* that the two can hardly with certainty be distinguished without recourse to the venation, and that is often difficult, from its being immersed, and from the thick and very opaque nature of the perfect fronds. Raddi has given good figures of several of the varieties of *Pt. pedata*, and many more might be adduced. Indeed they are of every intermediate grade, from cordate or ovato-cordate, quite undivided, some with the two lobes at the base, to three-lobed, almost regularly five-lobed, with the lobes acute or acuminate, and entire or more or less deeply tripartite, having the two lateral divisions bipartite (so as to take a pedate form, with the intermediate or terminal division three- or five-lobed), till at length we come to the more compound state considered to constitute the *Pt. pedata* of Linnæus, while the less divided is the *Pt. palmata* of Willdenow. In the former state, the terminal or intermediate primary lobe or division is usually narrowed and cuneate at its base. When its base is broader and more gradually decurrent with the lateral lobes, with a broader and more rounded sinus, it then becomes the *P. varians* of Raddi (t. 64), from which the *Pt. collina*, Raddi (t. 65. f. 1), cannot be distinguished. The ultimate lobes, or segments, vary extremely in length and breadth, as the fronds themselves do in size. One of our specimens from Rio (*Gardner*, *n.* 37) measures 12 inches in the breadth and 10 inches in the length of the frond, and the ultimate lobes are from an inch to an inch and a half in diameter.

80. Pt. (Litobrochia) *decipiens*, Hook.; caudex short thick ascending, fronds fasciculate subcoriaceous opaque pedately cordate in circumscription ternately divided quite to the rachis all the divisions deeply bipinnatifid, the primary segments lanceolate subfalcate acuminate, those of the terminal division opposite cuneately decurrent at the base and there entire (not lobed), those on the lowest side longer than those on the superior side and more divided, ultimate segments triangular-oblong obtuse, sori continuous, veins uniting and anastomosing so as to form large lax oblong areoles and arcs next the costa, stipes hispid at the base and as well as the rachises black-ebeneous.—Pt. pedata, *Hook. and Arn. in Bot. of Beech. Voy. p.* 107 (*excl. the synonyms*). Doryopteris pedata, *Brackenridge, in Fil. U. S. Expl. Exp. p.* 403 (*as far only as the specimens from the "Sandwich Islands" are concerned*). Pteris Beecheyana, *Nobis, MSS., and noticed under* Pellæa geraniifolia, *supra, p.* 133.

Hab. Oahu, Sandwich Islands, *Lay and Collie, in Beechey's Voy., Seemann in the Voy. of the Herald, Brackenridge*.—This I had at one time believed to be indentical with *Pellæa geraniifolia*, so exactly does it resemble it in habit and composition; and then, finding it to have unquestionably anastomosing

veins, Dr. Arnott and myself referred it to the *Pteris pedata;* but lately additional specimens from the same locality (Oahu) have led to a more accurate investigation, and to the opinion that it is distinct, from all the varieties of *Pt.* (Litobrochia) *pedata*, by the more compound nature of its frond (always tripinnatifid with numerous segments), as it is from *Pellæa geraniifolia* in the reticulated venation. In all probability, Mr. Brackenridge's *Doryopteris pedata*, from the "Sandwich Islands," is our plant; and hence, in his remarks upon it, he says, "some states of *P. geraniifolia*, Raddi (which has a forked free venation), might readily be mistaken for it when not carefully examined."

81. Pt. (Litobrochia) *decora*, Brackenr.; "cæspitose, stipites smooth semiterete paleaceo-hirsute at the base, fronds glabrous broadly ovate cordate at the base pinnated pinnatifid towards the apex, pinnæ pinnati-partite, segments linear obtuse angled at the sinus, sori subcontinuous."—Doryopteris decora, *Brackenr. Fil. U. S. Expl. Exped. p.* 103. *t.* 13. *f.* 1.

Hab. Sandwich Islands, in exposed situations, in crevices of rocks, and among decomposed lava.—"Three to ten inches high: rootstock short, thick, squamose. Pinnæ opposite, of three or four pairs, spreading, deeply pinnatifid. Segments (remote) 1 to 1½ inch long, about two lines broad, linear, obtuse, the lower and inferior one often again divided. Veins very slender and usually evident to the naked eye, forming long, very oblique, angular areoles."—The figure of this represents something very different from this group of *Pteris*, and quite unknown to me: and the author remarks, "Although the fronds are not strictly pedate, yet they may be said to resemble, in many respects, some forms of *Doryopteris pedata;* but its much smaller size, deeper divided and less coriaceous fronds, the narrower and more uniform size of the segments, the sori interrupted in the sinus, together with the paler stipes, readily distinguish it from that species."—It is quite different from our preceding species (*Pt. decipiens*, Hook.), which is equally a native of the Sandwich Islands.

82. Pt. (Litobrochia) *ludens*, Wall.; caudex long creeping branched thicker than a crow's quill scaly throwing out copious woolly fibrous roots, fronds remote on the caudex long-stipitate coriaceous opaque pale beneath triangulari-subhastate and undivided or hastately 5-lobed or deeply 3-lobed or 3-partite and pedate, the terminal lobe again 3- or pinnatifidly 5-lobed, the lateral lobes pinnatifid more or less deeply on the inferior side (*deorsum pinnatifidis*), segments acuminate broad-lanceolate or long-linear, veins everywhere laxly reticulated, the areoles oblong and mostly parallel or nearly so with the costa and margin, sori on the most deeply divided and narrowest fronds continuous, stipes very long and as well as the main rachises beneath black-ebeneous.—Pteris ludens, *Wall. Cat. n.* 88. Doryopteris Wallichii, *J. Sm. En. Phil. Philipp. in Hook. Bot. Journ.* iii. *p.* 404.

Hab. Scendnea, Irawaddy, 1826, and caves of the mountain Nidan, Attran River, 1827, *Wallich, n.* 88. Moulmeine, *Thos. Lobb.* Luzon, *Cuming, n.* 238.—

Though belonging to the same group as *Pt. pedata*, and in many respects resembling that species, it is truly and perfectly distinct; equally variable in the form of its fronds, and equally difficult with it to be distinguished in a few words. The caudex indeed would alone afford an excellent character; it is here long, slender, creeping, and branched, with no common point of origin for the fronds; these latter therefore are not fasciculate, but rise solitary from different and distant parts of the caudex. The stipes is rather stout, intensely black and glossy, short (4–6 inches) when bearing the nearly undivided fronds; elongated (14–18 inches) with the more divided and fertile ones: so that it would appear that much of the variation in form is due to the more or less developed state of the plant. In size the fronds are from 2–6 or 8 inches long; in shape, triangulari-cordate and quite entire, oblong or hastate, or hastate with the basal lobes bifid: all these are very obtuse; triangular-hastate with the lobes acute, cordato-pedate, deeply trifid or tripartite, each portion three-lobed acuminated, the central (or terminal) portion with the lobes equal, the lateral ones with the lobes on the lower side only,—finally, in the most perfect state, deeply pedately tripartite, each with about three narrow linear-lanceolate segments bordered all round and almost to the apices with the dark-brown continuous sori.

(*Fronds pinnate or bi- and even tri-pinnate. Pinnules free and entire, never pinnatifid, subpetiolulate.*)

83. Pt. (Litobrochia) *splendens*, Klfs.; frond ample pinnated firm-membranaceous dark blackish-green and satiny when dry, pinnæ a span to nearly a foot long often opposite broad-lanceolate finely acuminate serrated at the apex, terminal one sessile its base confluent with the base of the one beneath, lower pinnæ on rather short petioles, veins prominent uniformly anastomosing into sexangular oval or oblong areoles which are placed in almost horizontally patent series, sori rather narrow continuous, involucres very narrow, stipes and rachis slightly asperous.—*Kaulf. En. Fil. p.* 186. *Ag. Sp. Gen. Pterid. p.* 54. Litobrochia splendens, *Presl, Tent. Pterid. p.* 149.

Hab. In woods, Brazil, *Chamisso, Freyreis, Beyrich, Sellow (in Herb. Nostr.)*; Organ Mountains, *n.* 149, and Arrial das Minas, *n.* 5300, *Gardner.*—Entire fronds of this Fern must have a splendid appearance, judging from the portions sent to us by Mr. Gardner and from the size of the pinnæ, of which our largest is more than 10 inches long: the texture is firm-membranaceous, the surface satiny, the reticulations prominent and quite conspicuous to the naked eye.

84. Pt. (Litobrochia) *chrysodioides*, Fée; "fronds glabrous pinnated, stipites furrowed above, frondules (*pinnæ*) lanceolate incurved shortly petiolate obtuse rotundato-cuneate at the base, nervils sculpturate hexagonoid, mesoneure robust, sporothecia universal, indusium broadish, sporangia elliptical shortly pedicellate, annulus broad 18–20-articulate, spores thick trigonous heteromorphous."—Litobrochia chrysodioides, *Fée, Gen. Fil. p.* 136.

Hab. "South America" (*Fée*).—"Filix siccitate subtus lucida, facie *Chrysodii sculpturati.*"—Unknown to me, but much of the character corresponds with our previous species.

85. Pt. (Litobrochia) *papyracea*, Fée; "fronds pinnate bipinnate at the base alternate very glabrous, rachis deeply channelled, frondules lanceolate acuminate serrated at the apex acute at the base papyraceous when dry, pellucid membranaceous glossy, petiole and mesoneure channelled beneath, nervils forming hexagonoid unequal areoles (costal ones broad, marginal ones narrow), sporothecia very narrow continuous, indusia with the consistence and colour of the lamina, receptacle thick brown, sporangia ovate, annulus 16–18-articulate, spores blackish."—Litobrochia papyracea, *Fée, Gen. Pterid. p.* 136.

Hab. "South America, *Gardner.*—Filix elata papyracea, frondulis remotis exacte lanceolatis acuminatis."—As a plant of Mr. Gardner's it must have been gathered in Brazil, the only part of South America visited by him. But though a full series of his collections have come to us, we find no bipinnated *Litobrochia* corresponding with the above description.

86. Pt. (Litobrochia) *lanceæfolia*, Ag.; frond pinnate submembranaceous, pinnæ linear-lanceolate shortly petiolate finally acuminated entire, veins scarce prominent anastomosing and forming subhexagonal areoles of which a series lies close to and parallel with the costa having an obliquely patent direction towards the margin, sori very narrow continuous or only interrupted towards the apex, rachis glabrous brownish.—*Ag. Spec. Gen. Pterid. p.* 63.

Hab. Interior of Madagascar, *Bojer, in Herb. Nostr.*—Two specimens only are before me, both wanting the stipes, so that it is possible the species may be bipinnate, but it is more probably allied to the Brazilian *Pt. splendens*, Klfs., and simply pinnate. Our largest specimen is 16 inches long; pinnæ 5–7 inches long, rather distant upon the rachis; terminal one long-petioled, lateral ones sessile above and even a little decurrent; the rest are on very short slightly hispid petioles. The largest and longest areoles formed by the anastomosing of the veins are parallel with and close to the costa; the rest are nearly regularly six-angled, and form series which have an obliquely patent direction, and extend quite to the margin. Involucre membranaceous, brown, very narrow.

87. Pt. (Litobrochia) *pulchra*, Schlecht.; ample elongated firm-membranaceous bipinnate, pinnules distant lanceolate finely acuminate the apex sharply (but not spinulosely) serrated the base tapering always sessile unequal the inferior base alato-decurrent, veins everywhere anastomosing, a series of the longest and broadest areoles is next the costa, the rest form long narrow very compact series or chains which are

nearly horizontally patent, sori continuous on almost every pinnule moderately broad, involucres very narrow, stipes and rachis glabrous tawny.—*Schlecht. Fil. Mex. in Linnæa*, v. *p.* 614. *Liebm. Fil. Mex. p.* 79. Pt. grandifolia, *Mart. and Gal. Fil. Mex. p.* 52 (*not Willd.*). Litobrochia Mexicana, *Fée, Gen. Fil. p.* 136.

Hab. Mexico; between Mazatlan and Colipa, *Schiede and Deppe;* Sta. Maria, Tlapacoyo, *Liebmann;* Oaxaca, elev. 5000 ft., *Galeotti, n.* 6376. Sierra San Pedro Nolasco, Talea, etc., *Jurgensen, n.* 871 and 715. Tapilula and San Bartolo, Chiapas, *Linden, n.* 1521.—A species clearly allied to the following, *Pt. Hœnkeana*, but quite distinct. Pinnules much smaller, narrower in proportion to their length, serrated only (and not spinulosely) at the apex, and, in all my numerous specimens, not only always sessile, but the lower margin is alato-decurrent.

88. Pt. (Litobrochia) *Hœnkeana*, Pr.; frond bipinnate subcoriaceous, pinnules oblong-lanceolate finely acuminate cuneate at the base more or less petiolulate the margins spinuloso-serrate, veins sunk everywhere anastomosing, the longest and broadest areoles forming a series next the costa the rest lie in series of narrow-oblong or linear areoles horizontally patent smallest next the margin, sori rather broad continuous, involucres very narrow, stipes elongated and rachises pale-brown, caudex thick elongated horizontal clothed with appressed rigid subulate scales.—Pteris Hœnkeana, *Pr. Reliq. Hœnk. p.* 55. *Ag. Sp. Gen. Pterid. p.* 54. Litobrochia Hœnkeana, *Presl, Tent. Pterid. p.* 149. *t.* 5. *f.* 24. Pteris ampla, *Kze. Syn. Pl. Crypt. Pœpp. in Linnæa, p.* 74.

Hab. Peru, Pampayaco, *Pœppig in Herb. Nostr.;* Carrapi, *Mathews, n.* 1803. New Granada, Ocaña, *Purdie, Linden, n.* 1028, *Schlim, n.* 644 *and n.* 597, elev. 5–7000 ft.; Woods, Antonio, Nevada di Sta. Martha, *Purdie.*—This is a noble species, of which our smallest entire specimen is three feet long. The pinnules are often a span and 10 inches long, and 1¾ inch wide.

(*Pinnules small, coriaceous, entire.*—Pellæoideæ.)

89. Pt. (Litobrochia) *Burkeana*, Hook.; caudex very short thick erect chaffy at the apex with tawny scales, roots wiry, fronds fasciculate (small) ovate coriaceous opaque glabrous pinnate below bipinnate with three to five pinnules, pinnæ of the upper portion and pinnules of the lower pinnæ articulated on short black petiolules mostly opposite oblong-elliptical or oblong-lanceolate obtuse one to two inches long, veins immersed anastomosing, areoles oblong obliquely arranged, sori narrow continuous to the very apex, involucre membranaceous, stipes and rachis (villous on one side) and

base of the costa beneath intensely black-ebeneous. (TAB. CXXVI. *B.*).

Hab. S. Africa, Macalisberg, *Burke.*—This has quite the habit of *Pellæa*, especially of the N. American *P. atro-purpurea*, and *Pellæa Boivini* (Nobis, supra, p. 147, Tab. CXVIII. A.); but besides other characters, this has the anastomosing venation of *Litobrochia*, among which it will naturally rank with *Pt. articulata*, our next species, but with no other known to me; and from that it is abundantly specifically distinct.

90. Pt. (Litobrochia) *articulata*, Klfs.; fronds (about a foot long) deltoid pinnate below horizontally bi- and even tri-pinnate subcoriaceous glabrous ferruginous beneath when dry, pinnæ of the upper portion and pinnules of the lower (all articulated upon short petioles) 1–2 inches long from a broad mostly cordate base ovate or lanceolate rather obtuse distant, veins anastomosing with oblong obliquely arranged areoles generally free and forked at the margin, sori continuous broad, involucre narrow membranaceous, stipes (longer than the frond) and the rachis fulvo-hirsute on one side and the petiolules intensely black-ebeneous. (TAB. CXXVI. A.)—Pteris articulata, *Kaulf. in Sieber Syn. Fil. Exsic. Maurit. n.* 77 (*Herb. Nostr.*). *Spreng. Syst. Veget.* iv. 76. *Bojer, Hort. Maurit.* 402. Litobrochia articulata, *Presl, Tent. Pterid. p.* 149. Doryopteris articulata, *Fée, Gen. Fil. p.* 133.

Hab. Mauritius, *Sieber;* arid, rocky places, Cascade of Reduit and that of Tamarin, *Bojer.* Bourbon, *Carmichael.* Madagascar, rocks on the ground at the Chute d'eau d'Ouwilave, Rivière Divoudrou (*Herb. Nostr.*).—With the same general ramification and arrangement of pinnules, and the same ebeneous stipes and rachis as our last species (*Pt. Burkeana*), this is nevertheless a very distinct and remarkable Fern. The frond is deltoid, the primary ramifications opposite and horizontal or nearly so; the pinnules spread at right-angles from the rachises, and are articulated upon little black petiolules, which, when the pinnule has separated after maturity, exhibits a small concave disc at the summit. In the ebeneous stipes this (as well as *Pt. Burkeana*) resembles our first or pedate subsection of *Litobrochia*, but in nothing else; and in referring this to *Doryopteris*, M. Fée destroys the peculiarity of habit which is all that recommended that group to Mr. J. Smith for the construction of the genus; indeed, M. Fée himself defined *Doryopteris*, "frondibus palmatis pedatis sagittatis." The same author has misunderstood Sprengel, who does not say of *Pt. articulata*, "que les *frondes* sont tres-entières," and so "inapplicable:" but his words are "*foliolis* subpetiolatis cordato-oblongis obtusis *integerrimis.*"

(*Pinnate or bipinnate; pinnules or ultimate pinnæ pinnatifid.*)

91. Pt. (Litobrochia) *Brasiliensis*,* Rad.; caudex short

* This and the two following well-known and allied species Agardh refers to a group with pinnæ or pinnules undivided, but he qualifies the character by the expression in the specific characters, "pinnis ala angusta longe decurrentibus, infimis pinnatisectis," showing a pinnatifid form at variance with the previously mentioned group.

thick rooting, fronds deltoid-ovate 1–2 feet long firm-membranaceous dark green bipinnate, pinnæ generally opposite broad-lanceolate (especially the sterile ones) lowest pair chiefly compound pinnatifid with the lowest inferior pinnæ distinct simple or bipartite the rest undivided or pinnatifid on the lower side, uppermost more or less confluent and decurrent but not forming a narrow wing to the rachis, areoles large next the rachis few between them and the margin, sterile pinnæ and apices of the fertile ones spinuloso-serrated, stipites and rachis greenish-brown (in Sellow's specimens pale straw-colour).—*Raddi, Syn. Fil. n.* 111. *Fil. Brasil. p.* 47. *t.* 68 *and* 68 *bis. Ag. Sp. Gen. Fil. p.* 55. Litobrochia Brasiliensis, *Pr.*

Hab. Brazil, extremely common, judging from the copious specimens we have received thence, and from that country alone. About Rio, *Raddi*, and all subsequent botanists; *Gardner, n.* 35 (all the pinnæ deeply pinnatifid) and *n.* 34, etc. South Brazil, *Sellow;* Porto Alegre, Rio Grande, *Mr. Fox* (exhibiting much affinity with *Pt. denticulata*); Ilhios (*Moricand*), San Castaño, Minas Geraes, *Gardner* (possibly *Pt. denticulata*). *Mr. Boog* (no exact locality) sends specimens with the lowest pinnæ almost a foot long, deeply pinnatifid (the lowest segments only free), with eleven large alternate lanceolate segments 4–5 inches long; and *Mr. Gardner*, from Minas Geraes (*n.* 5670) what appears to be an *inferior* pinna of this species 1½ foot long, pinnatifid, with nineteen opposite decurrently confluent segments, one of which is 9 inches long, the apices scarcely serrated.—A most variable plant, independent of its disposition to unite with the following species. The larger specimens are more than 3 feet long, including the stipes, and are very handsome.

92. Pt. (Litobrochia) *denticulata*, Sw.; caudex very short scarcely any copiously rooting, fronds fasciculate long-stipitate a span to a foot long deltoideo-ovate membranaceous, pinnæ 7–13 remote decurrent into a long narrow wing on the rachis narrow-lanceolate acuminate tapering at the base, superior ones undivided and confluent the rest bipartite or pinnatifid usually on the lower side only sometimes with the lowest pair long-petioled pinnatifid on both sides, lowest inferior segment bi-tripartite, sterile ones and apex of the fertile ones spinuloso-serrate, areoles large next the costa the rest few, veins nearly all free in the very narrow pinnæ, stipes longer than the frond compressed and the rachis greenish-brown.—*Sw. Prodr. p.* 129. *Fl. Ind. Occ. p.* 1600. *Syn. Fil. p.* 97. *Willd. Sp. Pl.* v. 272. *Hook. and Grev. Ic. Fil. t.* 28 (*excl. the syn. of* Pt. Brasiliensis, *Raddi, and* Pt. quadrifida, *Pr.*), *Ag. Sp. Gen. Pterid. p.* 56. Pt. tristicula, *Raddi, Syn. Fil. n.* 112. *Fil. Brasil. p.* 46. *t.* 69. Pt. reticulata, *Desv.* Litobrochia, *Pr.*

Hab. Hispaniola, *Swartz;* Cuba, *C. Wright,** 1857, *n.* 270. Brazil, about Rio, *Raddi, Forbes, Armstrong, Boog, Milne, and Macgillivray.*—"Quasi præcedentis (*Pt. Brasiliensis*, Rad.) status junior; ab auctoribus cum ea quoque frequenter confusa vel judicata fuit," is the remark of Agardh. Dr. Greville and myself had expressed an opinion that these two supposed species were identical, and I confess to the difficulty in determining some of the many varieties of *Brasiliensis*. The winged rachis here and less compound and narrower pinnæ are perhaps the best characters. It is remarkable, however, that *Pt. denticulata*, which is much the rarer of the two in Brazil, and, I believe, only found about Rio, should be detected, as it now has been, in two of the West Indian islands, and even first discovered in one where *Pt. Brasiliensis* has never been known to exist.

93. Pt. (Litobrochia) *leptophylla*, Sw.; caudex small knotted sub-tuberiform, fronds 4–5 inches to a span long pale-green thin-membranaceous pellucid cordate or deltoid subpedate long-stipitate fascicled bipinnate tripinnate below, ultimate pinnæ pinnatifid, pinnules and segments all linear subacuminate decurrent so as to form winged rachises except at the bases of the pinnules slightly falcate, sterile ones (which are lanceolato-acuminated) and apices of the fertile ones setosely serrate, veins forming a single series of large areoles next the costa the rest free, in the narrow pinnules and segments all free, stipites slender longer than the fronds greenish-brown or stramineous.—*Sw. in Act. Holm.* 1817. *p.* 70. *Ag. Sp. Gen. Pterid. p.* 57. *Presl, Tent. Pterid. p.* 145. Pt. spinulosa, *Raddi, Syn. Fil. Bras. p.* 70 *and* 70 *bis.* Cheilanthes spinulosa, *Link, Hort. Berol.*

Hab. Brazil, whence I have received many specimens from the neighbourhood of Rio, *Raddi, Lady Calcott, Boog, Forbes, Macgillivray and Milne, Gardner, n.* 32, *Sellow* (probably from South Brazil).—This evidently belongs to the same group or set with *Pt. Brasiliensis* and *denticulata*, exhibiting the setiferous serratures, and it cannot naturally be separated from them; yet in one and the same specimen even we find the venation of a *Campteria*, and more copiously that of true *Pteris*, and none of real *Litobrochia:* and I have already intimated my opinion, p. 173 of this Volume, that *Pteris gracilis* of Fée, (see our figure, Tab. CXXVIII. A.) is probably merely the state of this plant with *all* free veins. In short, it is rare in *Pt. leptophylla* to find any anastomosing veins save in the broader sterile pinnules. As in many other Ferns, it is difficult to say whether the divisions of this species should be considered pinnate (with decurrent and confluent pinnules) or pinnatifid: the two characters are combined, and only the lower portions of the primary divisions are strictly pinnate (destitute of decurrent wing or margin).

94. Pt. (Litobrochia) *gigantea*, Willd.; fronds ample bi-

* In the same beautiful collection, "Plantæ Cubenses Wrightianæ," are specimens of *Pt.* (Eupteris) *gracilis*, Fée, previously only known as a native of Brazil, which came too late to be recorded under that species at p. 173 of this Volume. It is *n.* 568 of the above-collection.

pinnate membranaceous but somewhat succulent paler and subglaucous beneath dull and opaque, pinnæ 1 to 1½ foot or more long broad-lanceolate acuminate, sessile or nearly so more or less deeply pinnatifid, segments oblong or lanceolate generally subfalcate and acuminate serrated at the apex approximate, sinuses obtuse rounded, veins anastomosing and forming a single shallow arc (or costal areole) at the base of and between the segments, broader ones in a series at the segmental costæ, sori continuous at the sinuses, rachises (the stouter ones muricated with short sharp tubercles) brown stramineous glossy.—*Willd. Sp. Pl. p.* 381. *Kze. Synops. Pl. Pœpp. p.* 75. *Ag. Sp. Gen. Pterid. p.* 58. Litobrochia, *Pr.*

Hab. Caraccas, *Bredemeyer;* Pampayaco, Peru, *Pœppig;* New Granada, near Bogotá, *Purdie;* Triana, *Linden;* Antioquia, *Jervise;* Guadaloupe, *L'Herminier;* Ocaña, 7000 ft. elev., *Schlim, n.* 605 (fronds dark-green on both sides, basal areole generally forming two arcs, one long and narrow one, and one shorter and broad one).—In this and some of the following species we have examples of fronds so large that few collectors have gathered sufficiently comprehensive specimens to enable us to form an opinion of the ramification. Willdenow, Agardh, and Kunze describe this as simply pinnate, with the pinnæ pinnatifid: some of my specimens prove that it is at least bipinnate. The texture appears as if of a thick and fleshy character when recent, with sunken veins which are best seen on the under side, where they are of a dark colour upon a pale, somewhat glaucous surface. The segments are not much elongated (2–3 inches long), and all the pinnæ are regularly pinnatifid and nearly sessile, the sinuses vary in breadth, and are sometimes almost biangular. The basal areoles of the venation, as Agardh well observes, form one arc (very rarely two, and then very unequal in size), and this arc lies parallel with and close to the main costa, forming almost a straight line, extending from one costule to the next. The Ocaña specimens from Schlim vary a little from those of other localities, all of which quite accord with Pœppig's plant, which is the authority for Kunze's *Pt. gigantea*, and is, I have no doubt, the same as Willdenow's.

95. Pt. (Litobrochia) *crassipes*, Ag.; "fronds (ample) pinnate, pinnæ pinnatifid the segments on each side equally confluent linear-lanceolate falcate, sinuses rounded, basal veins forming a single arc," *Ag. Sp. Gen. Fil. p.* 59.—"Pt. gigantea, *Sieber, Syn. Fil. n.* 161. *Presl, Reliq. Hænk. p.* 55."

Hab. West Indies: Martinique, *Sieber;* Island of St. Vincent, *L. Guilding.* New Grenada, *Purdie, Linden.*—I retain this species of Professor Agardh with much hesitation, for I do not myself see how the specimens from St. Vincent, which he had in view when he drew up his specific character and description, differ from *Pt. gigantea*, except in the longer pinnæ, more deeply pinnatifid, with longer segments, in the great thickness of the rachis and upper portion of the stipes, and in the "venæ basales monoarcuatæ, sed ita arcte costæ adpressæ, ut vix nisi apice pinnarum deteguntur:"—nor do the respective specific characters of the learned author point to any marked differences. I have no access to

specimens of *Pt. gigantea* of Presl, and of Sieber, Fl. Martin. n. 366, which Agardh refers hither, but Kunze (Linnæa, vol. ix. p. 76) to *Pt. podophylla*, Sw.

96. Pt. (Litobrochia) *Berteroana*, Ag.; fronds ample bipinnate below membranaceous glabrous pale-green, superior pinnæ and pinnules broad-lanceolate acuminate deeply pinnatifid sessile and decurrent at the base, segments lanceolate approximate erecto-patent acute or acuminate serrated muticous, sinuses acute, basal veins mono-arcuate, secondary areoles marginal, sori on the margin of the segments not extending to the apex nor to the bottom of the sinus, involucres rather broad membranaceous, stipes rachises and main costæ tawny very smooth.—*Ag. Sp. Gen. Pterid. p.* 66. "Pt. tenera, *Kaulf.?*" *Bertero, MS. Colla, Pl. Rar. Chil.* iv. *p.* 38.

Hab. Shady woods, Juan Fernandez, *Bertero, Cuming, in Herb. Nostr.*—Pinnæ a foot long, upper ones and pinnules adnato-decurrent, in the widest part 3–4 inches. Segments 2 and more inches long, sterile ones duplicato-serrate. Sinuses narrow, acute; areoles only one or two between the basal arc and the margin, so that the areoles are comparatively large and few.—Claude Gay, in his 'Flora Chilena,' has four species of *Litobrochia*, all from Juan Fernandez:—1, *Pt. incisa*, Th., and of this work; 2, *Pt. patens*, Presl, Anal. Pterid., not Hook. (a species not retained in the 'Tentamen' of that author); 3, *Pt. appendiculata*, Kaulf., always considered the same as *decurrens*, Pr.; and 4, *Pt. decurrens*, of Presl and Raddi; but to none of them can our *Pt. Berteroana* be referred.

97. Pt. (Litobrochia) *Endlicheriana*, Ag.; fronds ample bipinnate below membranaceous glabrous pale-green, superior pinnæ and pinnules broad-lanceolate acuminate nearly sessile, segments lanceolate scarcely falcate rather obtuse serrated muticous, sinuses very acute, basal veins mono-arcuate, fourth series of areoles marginal, stipes and rachises tawny glossy.—*Ag. Sp. Gen. Pterid. p.* 66. *Hook. Ic. Plant. t.* 973. Pt. comans, var., *Hook. fil. Fl. N. Zeal.* ii. *p.* 26. Pt. Zahlbruckneriana, *Endl. Fl. Norfolk. p.* 13?—*β.* segments of the pinnæ copiously pinnatifid.

Hab. Norfolk Island, *Allan Cunningham, Ferd. Bauer, C. J. Simmons, Esq.* New Zealand, *D'Urville, Cunningham, Sinclair, Hooker fil.* Tasmania, *R. Gunn* (var. *β* only). Society Islands, *Cuming, n.* 1426 (*α* only). Pacific Islands, north of Norfolk Island; Sunday or Raoul (Kermadee), and Angau, Feejee (pinnæ very large), *Macgillivray and Milne, in Capt. Denham's Voyage of the Herald.*—Our figure in the 'Icones Plantarum,' l. c., gives as good an idea as can be done, on so small a scale, of the *Pt. Endlicheriana*, Ag.; and those who have seen the Juan Fernandez *Pt. Berteroana* of the same author, must be struck with the very great similarity between the two; nor was Agardh himself ignorant of this, but he observes that they differ in the nature of the veins. Certainly the areoles are much smaller and more numerous in segments of the same size of the present plant than in *Pt. Berteroana;* so that, in general, a second areole from the costule attains the margin in the one, while in the other there are four areoles be-

tween the costules and the margin. If this character cannot be depended upon, still less can the other trifling differences in the form of the pinnæ and segments noted by Agardh be considered of value. Indeed the protean forms of the Litobrochia group of *Pteris* seem endless. Dr. Hooker, in his 'Flora of New Zealand,' unites our present plant with the following, *Pt. comans*, but at present I prefer keeping them apart.

98. (Litobrochia) *comans*, Forst.; fronds ample pinnate lowest pair bipartite or again pinnate membranaceous dark-green glabrous pinnate generally a span to a foot and more long ovato-lanceolate very deeply pinnatifid cuneate at the base petiolate, segments subopposite decurrenti-confluent (so that the two opposite bases take a wedge-shaped form) linear-lanceolate ensiform patent straight or falcately decurved remote 3 to 4–5 inches long sterile portions strongly serrated, sinuses with a downward direction (*sinubus deorsis*) acute, basal veins form one long or 2–3 shorter arcs, areoles numerous, sori marginal not extending to the apex rarely to the base of the sinus, stipes and rachises stramineous glossy. —*Forst. Prodr. p.* 79 *n.* 419. *Sw. Syn. Fil. p.* 98 *and* 292. *Willd. Sp. Pl.* v. *p.* 381. *Schkuhr, Fil. p.* 86. *t.* 92. *Ag. Sp. Gen. Pterid. p.* 59. Litobrochia, *Pr. Brackenr. in Fil. U. S. Expl. Exped. p.* 105.—*β.* pinnæ smaller, segments more or less pinnatifid.

Hab. "New Zealand," *Forster* (in Florulæ Ins. Austral. Prodr.). By some unaccountable accident, an original specimen of Forster, in my herbarium, was marked "Ind. Or.," and hence the note to that effect in Agardh. The fact is, it was received without any locality attached to it. It is a remarkably fine specimen (1½ foot long), and certainly I have seen nothing resembling it from New Zealand, rich as our herbarium is in plants of that country; but I have specimens identical with Forster's plant from Tanna, New Hebrides, from Aneiteum, from the Island of Futuna, from Angau in the Feejee group, and our var. *β*, from Lord Howe's Island, from *Milne and Macgillivray;* so that I cannot but suspect some error in the locality given by Forster, and that Tanna should be substituted for New Zealand, an island we know he visited, and where our collectors remark, "it is abundant in woody places." All Dr. Hooker's *Pt. comans* (Fl. N. Zeal. l. c.) may be referred to the species or variety, as it may be, of *Pt. Endlicheriana* above described. Some of our specimens have pinnæ with segments half a foot long. *Brackenridge* also gives Tahiti, in the Society Islands, and Ovalau, in the Feejee group, as localities.—To me this appears a very distinct species, remarkable for the great size of the pinnæ, and the long, truly ensiform, decurrent, much acuminated segments. The smaller specimens have the segments more or less pinnatifid, when it becomes the var. *β* of Brackenridge,

99. Pt. (Litobrochia) *macilenta*, A. Cunn.; caudex small subrepent, frond broad ovate 3-pinnate 1–3 feet long thin membranaceous pellucid, pinnæ and pinnules remote alternate, ultimate pinnules small (1–3 inches) ovate or deltoid cuneate at the base petiolate pinnatifid, terminal ones elon-

gate acuminate, lobes oblong or ovate acute coarsely inciso-serrated at the apex, lobes and serratures submucronate, basal veins forming a single arc and 2 or 3 large areoles are formed on each side of the costule of the segments, the rest of the veins are free, sori on the sides of the lobes often short, stipites as long as the frond castaneous, rachises slender and flexuose stramineous.—*A. Rich. Fl. N. Zeal. p.* 82. *t.* 12. *A. Cunn. Specim. Bot. of N. Zeal. in Hook. Comp. Bot. Mag.* ii. *p.* 365. *Hook. fil. Fl. N. Zeal.* ii. *p.* 26. *Presl, Tent. Pterid.* Litobrochia macilenta, *Brackenr. Fil. U. S. Expl. Exped. p.* 106.

Hab. Dry woods in the Northern Island of New Zealand, *D'Urville, A. Cunningham, Colenso, Sinclair, J. D. Hooker, Brackenridge.* Akaroa, in the Southern Island, *Dr. Lyall.*—It would be a great blessing if all Pterises were as distinct as this. It is difficult to say which are its near affinities. A. Richard justly observes, "Elle se rapproche un peu au *Pteris Vespertilionis* de M. Labillardière, mais néanmoins elle est fort distincte." The pinnules are small, and there are but few areoles, and those confined to the costa and the costule (not extending to the apex of the latter), the rest of the veins are free. Richard's figure faithfully represents the frond, but the venation is inaccurate.

100. Pt. (Litobrochia) *Woodwardioides*, Bory; "fronds pinnate very glabrous, pinnæ sessile pinnatipartite lowest ones bifid, segments oblongo-lanceolate obtuse entire fertile ones acuminate, basal veins forming a single arc, areæ and secondary areoles submarginal," *Ag.*—*Bory, in Willd. Sp. Pl.* v. *p.* 360. *Ag. Sp. Gen. Pterid. p.* 60. Pt. altissima, *Poir, Encycl. p.* 122. *Sw. Syn. Fil. p.* 99, *and Willd. Sp. Pl. p.* 382 (*Ag.*). Pt. pellucida, *Kaulf., in Sieb. Syn. Fil. n.* 74 (*Herb. Nostr.*). Litobrochia, *Pr.*

Hab. Mauritius, *Sieber, Carmichael* (*in Herb. Nostr.*).—Our specimens, probably wanting the lowest pair of pinnæ, do not exhibit their bipartite character described above, and which, if present, would exhibit a form very much resembling *Pt.* (Eupteris) *quadriaurita*, and *Pt.* (Campteria) *biaurita*, but this has the venation of a *Litobrochia*, and hence has no small affinity with *Pt. decurrens*, Raddi (of Brazil), next to which Agardh places it, and to *Pt. aculeata*, Sw. The pinnæ are very similar, but in our present plant less tapering; in short, they are almost truncated at the base, and quite sessile. "Pinnarum," Agardh says, "usque 8 paria. Pinnæ semipedales et ultra, sessiles, infimæ auriculatæ, seu si mavis bipartitæ, sursum arcuatæ. Laciniæ utrinque subæqualiter confluentes, in planta sterili oblongæ obtusissimæ, in fertili lanceolatæ et falcatæ, sinubus rotundatis discretæ. Venæ basales monoarcuatæ, ramos anastomosibus sparsis junctos emittentes."—It remains to be ascertained whether this may not be a Mauritian form of some other well-known species, somewhat altered by peculiarity of climate.

101. Pt. (Litobrochia) *decurrens*, Pr.; fronds 1½–2 feet long (excluding the stipes) pinnate membranaceous lowest pair bipartite, pinnæ lanceolate acuminate deeply pinnatifid

attenuated at the base and more or less decurrent on the rachis, segments lanceolate or linear-lanceolate sterile portions serrated, basal veins mono-arcuate, tertiary areoles marginal, rachis and costæ stramineous glossy.—*Presl, Del. Prag. p.* 183. *Raddi, Fil. Brasil. p.* 48. *t.* 69 *bis. Ag. Sp. Gen. Pterid. p.* 61. Pt. appendiculata, *Kaulf. Enum. Fil. p.* 187. Pt. lata, *Kaulf.* (*Presl*).

Hab. Brazil: shady woods about Rio, *Gaudichaud, Raddi, Gardner, n.* 153 *and* 33, *Macgillivray, n.* 205, *and Milne, Lady Calcott, J. D. Hooker.*—The principal distinguishing mark of this species is to be found in the decurrent base of the pinnæ, especially in the upper part of the frond, which gives a winged character to the rachis. Pinnæ 7–17 on one frond, 6–8 inches long.

102. Pt. (Litobrochia) *spinulifera*, Schum.; frond 1–2 feet long pinnate glabrous, pinnæ petiolate broad-lanceolate acuminate pinnatifid lowest pair bipartite, segments lanceolato-oblong obtuse toothed at the apex, basal veins subbiarcuate, tertiary areoles marginal, costules of the segments with a series of areoles on each side, the rest of the veins free, costæ densely spinuliferous beneath rarely unarmed, stipes and costa often ebeneous at the back, *Ag.—Schumacher, Beskr. Guin. Plant. p.* 459. *Ag. Sp. Gen. Pterid. p.* 62.

Hab. West Africa: Guinea, *Mortensen;* Congo, *Chr. Smith, in Herb. Banks;* Fernando Po, *Dr. Vogel;* Cape Palmas, *Ansell;* Sierra Leone, *Barter, in Baikie's Second Niger Expedition.*—Frond 2 feet high, pinnated, dark-green. Stipes castaneous, posterior side sometimes ebeneous, muriculated with retrorse spinules, rachis on the anterior side rough. Costæ with numerous spinules beneath, above quite smooth. Pinnæ sometimes a foot long, oblong-lanceolate, the lower pair bifid or bipartite. Sterile segments very obtuse and oblong, entire, or with only 2–3 teeth at the apex; fertile ones more lanceolate, obtuse, and slightly toothed at the point. Our specimens from Vogel, Ansell, and Barter, exactly correspond with the description of Schumacher's plant; sometimes however the spines are absent, and sometimes the colour of stipes and rachises is on the under side purple, or black and glassy. The habit and form of the plant are exactly those of *Pt. quadriaurita* and *Pt. biaurita*, and the three can scarcely be distinguished with certainty but by the venation, one being of the subgenus *Eupteris*, one of *Campteria*, and one of *Litobrochia*.

103. Pt. (Litobrochia) *Kunzeana*, Ag.; fronds ample pinnate (below bipinnate?), pinnæ petiolate a span to a foot long coriaceo-membranaceous broad-lanceolate caudato-acuminate pinnatifid, segments approximate ovate or lanceolate falcate acute or acuminated the apices sharply serrated with rounded sinuses, basal veins bi-triarcuate, sori continuous at the margins and sinuses of the segments the apices sterile. (Tab. CXXXIX.)—*Ag. Sp. Gen. Pterid. p.* 62. Pt. podophylla, *Kze. Syn. Pl. Pœp. p.* 75 (*excl. syn.*). Filix ramosa arborescens et aculeata, *Plum. Fil. p.* 6. *t.* 5 *and* 11.

Hab. Martinique, *Plumier.* French Guiana, *Leprieur, Richard (Agardh).* Peru, *Pœppig (in Herb. Nostr.).* Pangoa, Peru, *Mathews, n.* 1109 *and* 1802. Porto Rico, *Riedeley (Agardh).* Ecuador and Bay of Ellia, *Seemann.* Jamaica, *Purdie.*—My knowledge of this fine species is derived mostly from specimens in my herbarium: (1.) from Kunze's "*Pt. podophylla*" (certainly not of Swartz), and to which Agardh has given the name of *Kunzeana;* (2.) from Mathew's specimens, also named by Agardh; and (3.) from specimens gathered by Seemann in Ecuador (figured at our Tab. CXXXIX.), all of which I consider to be specifically identical, and to correspond with the figure above quoted of Plumier, Fil. t. 5. and 11, a Fern which I suspect has been greatly misunderstood. Swartz and others have referred to it a plant (*Pt. aculeata,* Sw. and Agardh) which has so little resemblance to it that Agardh himself refers doubtfully to Plumier's figure for that species; and I think it is impossible to compare our specimens of *Pt. Kunzeana,* named by Agardh, and particularly that state of it which we have received from Ecuador (*Seemann*), without saying that they are one and the same species. It is quite true, judging from our specimens of portions only of the fronds, it is out of our power to say whether this (and *Pt. aculeata,* to which the character is equally assigned) is *arborescent* or not. Although Plumier calls this "Filix *arborescens* ramosa et aculeata," his description is at variance with this, and to me not very intelligible: "La racine de cette Fougère est composée de beaucoup de fibres épaisses, d'où il sort quelquefois une tige basse, épaisse comme le corps d'un homme, et toute hérissée d'épines très-noires. Il n'en sort bien souvent aussi que de grandes costes (*stipites*), garnies d'épines en si grand nombre qu'elles forment un buisson qui fait peur, ainsi que la tige, qui ressemble plutôt à un hérisson qu'à la tige d'une plante." And again, "*Les costes* (stipites), qui naissent *ou du tronc ou immédiatement de la racine,* ont dans leur commencement presque trois pouces d'épaisseur; elles s'élèvent jusqu'à *la hauteur d'un homme,* diminuant toujours petit à petit, et se partageant à leur sommité *en trois branches, dont les collatérales se partageant un peu plus haut en deux autres branches,*" etc. Now Swartz seems almost to have copied these words into his Flora Ind. Occ., p. 1601 ("stipites plures, *orgyales,* sive radicales, sive in caudicem brevem uniti, apice 3-partiti, ramis lateralibus iterum bipartitis"), so as to render it doubtful if he has not relied wholly on Plumier's description, and had that and Plumier's figure in view, rather than what goes now by the name of *Pt. aculeata,* and which Agardh has determined to be the same as ours. The only aculeated portion of this Fern figured by Plumier appears intended for the base of the stipes, and that is not much unlike what we find in a portion of the stipes of *Pt. gigantea* in our possession.

Although however I unhesitatingly refer *Pt. Kunzeana* to Plumier's "Filix arborescens ramosa et aculeata," I am far from being satisfied that it is permanent in its characters, and that it does not pass into other supposed species. Mr. J. Smith has a memorandum attached to what appears to be a slight variety of this very species, from Jamaica: "*Pteris* (Litobrochia) *aculeata,* Sw., *macroptera,* Lk., *decurrens,* Raddi, *polita,* Lk., *Beecheyana,* Ag., *Endlicheriana,* Ag., *elata,* Ag., *Berteroana,* Ag., etc. etc.; how do they differ?" To these might with almost equal propriety be added, *gigantea,* Willd., *crassipes,* Ag., *comans,* Forst., *Woodwardioides?,* Bory, and *propinqua,* Ag. Yet very able botanists have held them to be distinct.

If indeed we could confine ourselves to some of the very well-marked forms to be seen in herbaria of small extent, the difficulty of assigning characters would not be great; but our extensive suites of specimens from different collectors and different localities, while they tend to throw doubt on the permanency of many species, render it almost impossible to draw up such definitions as shall include the numerous forms we may be disposed to consider as belonging to one and the same species.

104. Pt. (Litobrochia) *elata*, Ag.; frond ample subcoriaceo-membranaceous bipinnate, pinnæ petiolate ovato-lanceolate deeply pinnatifid, segments remote lanceolate long and finely acuminate serrated at the apex, sinuses biangulate, basal veins 3–4-arcuate, third series of areoles submarginal, sori continuous round the sinuses, stipes and rachises pale-brown or straw-colour glossy smooth.—*Ag. Sp. Gen. Pterid. p.* 63. Pt. macroptera?, *Lk. Hort. Berol. p.* 32 (*Ag.*). *Klotzsch in Linnæa*, xx. *p.* 342?

Hab. Panama, *Cuming, n.* 1267, and Chirambira, *Seemann* (*Herb. Nostr.*). Caracas, *E. Otto, in Herb. Nostr. n.* 607?—"Species," says Agardh, "si quid video certe distincta, sinubus biangulatis et venis pluri-arcuatis necnon petiolis longioribus ab affinibus diversa. . . . Pinnæ circiter pedales petiolis semipollicaribus suffultæ, inferiores pinnulatæ. Laciniæ angulo fere recto a parenchymate costæ egredientes, lanceolatæ, et apice longe acuminatæ, medio aliquantulum latiores, majores usque 4-pollicares. Sinus biangulati. Venæ basales plerumque 3 arcus efficiunt, quorum infimus sequentes longitudine æquat. Areæ secundanæ singulæ, arcubus superioribus duobus interjectæ, costam fere tangunt."—Accurately as Agardh has described this Fern from specimens in our herbarium, I cannot but question its being really distinct from the *Pt. aculeata*. The specimens from Seemann, which I am disposed to consider the same, exhibit some pinnæ quite resembling that species, and having both angled and rounded sinuses. It is probably a very variable species, and our friend Dr. Klotzsch may be quite right in referring to it E. Otto's n. 607, which exhibits very varied pinnæ on the same specimen, and upon a large scale. In the authentic sample now before us, the apex of a branch 2 feet long is pinnatifid, with segments 6–7 inches long; below it is pinnated with entire or nearly entire pinnæ of the same length, and below that with ovate, acuminated, pinnatifid pinnæ. The same form I possess from Tovar, Columbia, from Moritz, n. 118, named "*Pt. gigantea*, Herb. Willd.;" and so Dr. Klotzsch says it is the n. 19,990 of that Herb. (but not of Sp. Plant.), and from Fendler,* n. 95; and n. 155 of Linden, Caracas, only differs in having, between the lower pinnatifid pinnæ of the branch and the terminal one, five pairs of remote, entire pinnæ.

105. Pt. (Litobrochia) *propinqua*, Ag.; "frond rigid below bipinnate, pinnules subpetiolate lanceolate wider at the base pinnato-partite, segments lanceolate subfalcate rather obtuse mucronate and sharply serrated, sinuses rather acute, basal veins monoarcuate, secondary or tertiary areoles marginal," *Ag. Sp. Gen. Pterid. p.* 65.—Pt. polita, *Link, Hort. Berol. p.* 30. Var. *Cumingiana*, Ag.; narrower, pinnæ 4–5 inches long, and an inch and a half broad (segments shorter and more falcate).—*Ag. l. c.* Pt. Orizabæ, *Mart. et Gal. Fil. Mex. p.* 53. *t.* 13. Pt. apicalis, *Liebm. Fil. Mex. p.* 78. Pt. podophylla, *Schlecht. in Linnæa*, v. *p.* 614.

* This fine specimen of Fendler exhibits the stipes as thick as the little finger, which is rough with small points at the base, and, as well as the short portion of a horizontal rhizome, clothed with subulate, black, rigid scales.

Hab. Jamaica, *Drs. Bancroft and Macfadyen, Purdie* (and var.? with membranaceous, pale-green fronds; larger pinnules, broader at the base, more or less petiolate; segments muticous). Esmeraldas, *Seemann, n.* 98.—Var. *Cumingiana;* Panama, *Cuming, n.* 1182. Venezuela, *Linden, n.* 99. Trinidad, *Lockhart.* St. Vincent, *Lockhart.* Galapagos, *Capt. Wood, R.N.* Mexico, *Galeotti, Liebmann, Linden, n.* 4.—" Stipes stramineous, smooth, trisulcate, several feet high, as thick as a goose-quill. Many of the lower pairs of pinnæ pinnulate, the lowest larger than the rest, a foot and a half long, on petioles 1–2 inches long, so that the frond is somewhat ternate. Superior pinnæ 7–10 inches long. Veins a little prominent." Of the var. *Cumingiana* Agardh observes, " Species vix diversa, licet habitu non parum insignis et magis ad *Pt. podophyllam* abiens, sed laciniis mucronatis necnon tota ramificatione ab hac aliena."

Of this *Pt. propinqua* I may observe, it will be difficult to distinguish it from some states of *Pt. aculeata*, Sw.; and the var. *Cumingiana*, with its more rigid fronds, shorter, more falcate, and often more mucronate segments, is, I fear, identical with *Pt. apicalis* of Liebmann. The pale-green membranaceous state sent by Purdie from Jamaica, besides its larger pinnules, which are more sessile, and more truncated at the base, wants the mucro to the segments, but these distinctions may be due to the plant growing under the shade of trees, and in very moist situations. It is probably wrongly referred here.

106. Pt. (Litobrochia) *hemipteris*, Fée; " fronds pinnato-pinnatifid very glabrous, frondules petiolate acuminate nearly opposite, segments slightly falcate toothed mucronated, of the two basal ones the superior one is much the largest."—Litobrochia hemipteris, *Fée, Fil. 8me Mém. p.* 76.

Hab. Mexico, very rare, *Schaffner.*—" Analogous to *Litobrochia Orizabæ*, Fée." " Il faudrait le revoir sur d'autres spécimens."

107. Pt. (Litobrochia) *setifera*, Fée; " fronds pinnate, rachis reddish trisulcate above (*duos fasciculos vasorum litteram* ω *eversam simulantes ferente*), pinnæ pinnatifid glabrous remote lanceolate, terminal segment long-acuminate, segments lanceolate falcate terminated by a very long and slender seta separated by a broad rounded sinus, sporothecia not extending to the serrated apex, indusium rather broad firm, sporangia ovoid mixed with chain-like amber-coloured hairs, annulus narrow 18-20-articulated, spores trigonous smooth."—Litobrochia setifera, *Fée, Gen. Fil. p.* 138.

Hab. Mexico, about the crater of the volcanic mountain St. Martin, *Galeotti, n.* 6571.—" Filix glabra, distinctissima."—The affinity of this, judging from Galeotti's specimens in Herb. Nostr., is certainly with our *Pt. propinqua*, var. *Cumingiana* (Pt. apicalis, *Liebm.*); but the segments are much narrower, gradually tapering from the base, and terminating in a long seta.

108. Pt. (Litobrochia) *aculeata*, Sw.; " fronds below bipinnate lowest pinnæ auriculate, pinnules subpetiolulate lanceolate pinnato-partite, segments lanceolate falcate serrated, basal veins biarcuate, tertiary areoles marginal."—*Sw. Prodr. p.* 129. *Fl. Ind. Occ. p.* 1001. *Syn. Fil. p.* 100 (*excl. the*

syn. of Plum.). *Willd. Sp. Pl.* v. *p.* 398. *Ag. Sp. Gen. Pterid. p.* 68. Pt. sterilis, *Pr. Del. Prag. p.* 184? Polypodium spinosum, *Linn. Sp. Pl. p.* 1554 (*Ag.*). Pt. Beecheyana, *Ag. Sp. Gen. Pterid. p.* 68. Pt. nemoralis, *Hook. et Arn. Bot. of Beech. Voy. p.* 75. Pt. Protea, *Liebm. Fil. Mex. p.* 76 (*fid. specim. in Herb. Nostr.*).

Hab. West Indian Islands: St. Vincent, most abundant, but the stipes even at the base exhibit no appearance of aculei, *L. Guilding, in Herb. Nostr.* (these being authority for Agardh's plant, Sp. Gen. Pterid. l. c., verified by comparison with Swartz's plant, I must consider it the *type* of the species, and any peculiar variation I shall here notice under the respective localities); Cuba, *C. Wright, n.* 873. Brazil, *Sellow* (*ex Herb. Reg. Berol.; an* Pt. elata, *Ag.?*). Venezuela, *Fendler, n.* 97 (small, more rigid, stipes quite smooth to the base). New Grenada, Ocaña, *Schlim, n.* 77, 5000 feet elev. (terminal pinnæ only with very long, remote segments, 3–4 inches long). Columbia, Salango, lat. 1° 34′, *Hinds* (pinnæ and segments remote and elongated, sinuses subbiangular). Ecuador, *Seemann* (pinnæ twice and even thrice the ordinary size, not otherwise different). Mexico: Tumaco, *Hinds* (large); Ycapa, *Linden, n.* 1509 (pinnules large, and scarcely different from *Pt. elata*, Ag.); Calipa (pinnæ large, membranaceous; segments remote, mostly opposite, and cuneately decurrent). Society Islands, *Nightingale* (copious specimens, large, but ordinary form). Coral Isles, *Beechey* (ordinary form).—This plant has already given occasion to some remarks under *Pt. Kunzeana*, p. 222, and I have ventured to consider that species (if species it be) as bearing a much greater resemblance to the "*Pteris arborescens ramosa et aculeata*," Plum. t. 5 and 11, always quoted under our present plant. But I cannot reconcile myself to the fact of either of these being a "Filix arborea;" nor do I find the stipites to be, in any specimen, as Swartz describes them, "aculeati," and as Plumier represents his species. Sloane's figure, t. 56, often quoted under the present species, Agardh properly excludes as too unsatisfactory.

109. Pt. (Litobrochia) *tripartita*, Sw.; fronds ample tripartite, lateral branches pinnate (bipinnate?) spreading long-petiolate submembranaceous glabrous, pinnules 4–6 inches or more long linear-oblong or linear-lanceolate subsessile acuminate rather deeply pinnatifid, segments approximate linear-oblong falcate (upwards) obtuse or acute entire or scarcely serrated and only at the apex nearly half an inch long, sinuses obtuse, basal veins forming a single arc parallel with the costa, a series of 3 or 4 or more areoles are parallel with the costule, rarely a second series appears between these and the free veins which thence extend to the margin, stipes elongated often stout and as well as the rachises subcastaneous.—*Sw. Syn. Fil. pp.* 100 *and* 293. *Willd. Sp. Pl.* v. *p.* 400. *Blum. Enum. Fil. Jav. p.* 211. *Presl, Reliq. Hænk. p.* 58. *Ag. Sp. Gen. Pterid. p.* 72. Pt. semiovata, *Poir. Encycl.* v. *p.* 723 (*Ag.*). Pt. revolvens, *Ag. l. c. p.* 73. Pt. subpedata, *Wall. Cat. n.* 10 (*young plant*). *Ag. l. c. p.* 71. Pt. intermedia, *Bl. En. Fil. Jav. p.* 211. *Ag. l. c. p.* 71, *note.*

Pt. longipes, *Don, Prodr. Fl. Nepal. p.* 15. *Bl. En. Fil. Jav. p.* 242. *Ag. l. c. p.* 70. Pt. uniseriata, *Poir. Encycl. Bot. Suppl.* iv. *p.* 608. Pt. linearis, *Poir. Encycl. Bot.* v. *p.* 723. *Sw. Syn. Fil. p.* 99. *Willd. Sp. Pl. p.* 379. *Wall. Cat. n.* 105. *Ag. l. c. p.* 70. Pt. marginata, *Bory, Voy.* 2. *p.* 192. *Willd. Sp. Pl.* v. *p.* 399. *Ag. l. c. p.* 67. Pt. connexa, *J. Sm. Fil. Philip. in Hook. Bot. Journ.* iii. *p.* 405. Var. *β. Junghuhnii?*, De Vriese in Herb. Nostr. (pinnæ longer less deeply pinnatifid, segments wider more falcate). Var. *γ. Milneana;* pinnules broader more deeply pinnatifid, longer segments. (Tab. CXXXVIII. B.)

Hab. East Indies: Molucca, *Gaudichaud;* Java, *Blume, Lobb* (*De Vriese*, var. *β, an sp. distincta?* but venation the same); Amboyna, *Labillardière* (*in Herb. Nostr., named by Agardh*); Luzon, *Cuming, n.* 204 (Pt. connexa, *J. Sm.*) and 41 (pinnæ elongated, pinnules crowded, segments deeper and longer). Singapore, *Wall. Cat. n.* 10 (*young*). Labuan, *Motley, Barber*, (segments of the pinnules acute). Ceylon, *Mrs. Gen. Walker, Gardner*. Bengal, Sylhet, *Wallich*. Mauritius, *Bojer*. Bourbon, *Carmichael (one specimen named* Pt. marginata, *by Agardh), Herb. Mus. Par.* Isle of Pines and Feejee Islands, *Macgillivray and Milne* (common form); and var. *γ* by the *same collectors*, and by *Dr. Harvey*. Society Islands, *Nightingale*. Tropical Africa: Isle of Galega, east coast, *Bojer;* and west coast, Fernando Po, *Vogel and Barter, in Baikie's Second Niger Expedition.*—This widely extended, but, I believe, exclusively tropical species (limited however to the old world), has been honoured with many names, not a few of which have been placed among the synonyms by Agardh, whilst I am alone responsible for bringing the rest under one species, viz. the *Pt. tripartita*, Sw. Nevertheless, the same author (Agardh) has paved the way for this union by the following remark under one of the above synonyms (*Pt. revolvens*, his *n.* 87):—"Tribum constituunt naturalissimam species (82–87, viz *Pt. Wallichiana*, Ag., *linearis*, Poir., *longipes*, Don, *subpedata*, Wall., *tripartita*, Sw., and *Pt. revolvens*) allatæ, arctissimo invicem affinitatis vinculo junctæ. et ita quidem similes ut eandem esse speciem omnes facile crederes. Differentiæ in externa forma adsunt, sed vix alii characteres quam qui venarum structura nituntur, revera valere videntur. Venæ in *Pt. Wallichiana* (this however I have without hesitation removed to the *Campteria* section) admodum simplices, in sequentibus sensim magis magisque anastomosantibus junguntur, et in ultima specie omnino reticulatæ evadunt, et ita inter species *Pteridis* venis furcatis, ceterasque quarum venæ reticulatæ, transitum efficiunt." I do not find any, however, to be *everywhere* reticulated: for here, as in most of this section (*Litobrochia*), when the pinnæ or pinnules are pinnatifid, there are areoles placed close to the main costa, generally described as "arcs" (monarcuate, biarcuate, etc.); again, analogous areoles are formed on each side the costule of the segment (as seen in our Tab. CXXXVIII. B., fig. 2), often confined to the base; occasionally adjacent to these areoles the anastomosing may be continued, all the rest of the veins extending to the margin being free in the Ferns now under consideration and in not a few others; so that they neither accord with *Campteria*, "venæ infimæ oppositæ in arcum angulatum anastomosantes," nor with *Litobrochia*, "venæ in maculas hexagonoideas anastomosantes."—There is indeed in § *Campteria* a group, or, as I have ventured to consider the individuals, a species (*Pt. Wallichiana*, Ag.), which, save in the nearly universal absence of areoles beyond the basal arc, has an almost perfect conformity with the present species. But there I have found occasionally a few areoles on the costule, never so much

as to justify the species being placed in § *Litobrochia.* (See *Pt. Wallichiana*, Ag., at our p. 206, n. 76.)

I would observe that I have more confidence in the several described species I have brought as synonyms under *Pt. tripartita* (and I possess, fortunately, authentic specimens in my herbarium) than I have in the two varieties I have made—β and γ. The first, from Java, has a form of pinnæ and segments almost approaching those of *Pt. podophylla* (our next species), but the texture is much thinner; and that is, I believe, a native only of tropical America: the second var. γ (Tab. CXXXVIII. B.), from the Feejee Islands, has very much the habit and structure of *Pt.* (Eupteris) *quadriaurita*, and of *Pt.* (Campteria) *biauriculata*, but the venation is quite that of the present species. The Society Islands plant, also referred there, has a peculiar habit, but the frond is sterile and the segments serrated.

110. Pt. (Litobrochia) *podophylla*, Sw.; fronds ample ternate subcoriaceous glabrous, lateral branches 3–4-partite, intermediate one simply pinnate, ultimate pinnæ or pinnules petiolate broad-linear acuminate deeply and regularly pinnatifid, segments approximate dimidiato-oval falcate acute (scarcely mucronate) serrate at the apex, sinuses rounded, basal veins monoarcuate, tertiary series of areoles marginal, stipes very stout submuricated near the base and as well as the rachises tawny glossy.—*Sw. Syn. Fil. p.* 100. *Willd. Sp. Pl.* v. *p.* 403. *Ag. Sp. Gen. Pterid. p.* 75. Lonchitis pedata, *Linn. Sp. Pl. p.* 1536. Lonchitis erecta tribrachiata, lateralibus bipartitis, medio recto simplici, *Browne, Jam. p.* 89. *t.* 1.

Hab. Jamaica, *Browne, Swartz, Tussac, Purdie, Dr. Alexander, Wilson.* Venezuela, *Fendler, n.* 98, *Moritz, n.* 47. Caracas, *Linden, n.* 175, 1539, and *n.* 542 (var. minor). Bogotá, *Holton, n.* 50. Ecuador, *Jameson.* Ocaña, 4–5000 feet elev., *Schlim, n.* 661.—This is a very fine and really very characteristic species, figured by Patrick Browne in his History of Jamaica, published more than a century ago. It was for a long time supposed to be peculiar to Jamaica, but the researches of travellers prove it to be not uncommon in the northern portion of South America. The form of the pinnules and segments of the *Pt. propinqua*, var. *Cumingiana*, Ag. (Pt. apicalis, *Liebm.*), often resembles these, but the habit of the two is very different; our plant is of a firm and rigid texture, with very long straight pinnated pinnæ, narrower pinnules, almost quite sessile, and muticous or nearly muticous and more falcate segments. The primary branches or rachises are thicker than the human finger, very smooth, rich tawny colour.

111. Pt. (Litobrochia) *longibrachiata*, Ag.; "fronds ternate, lateral branches 2–3-partite and as well as the intermediate simple one pinnate, pinnæ subpetiolate ovato-lanceolate pinnato-partite, segments lanceolate falcate nearly entire, basal veins forming a single arc, the fourth and fifth areole marginal," *Ag. Sp. Gen. Pterid. p.* 75.—Pt. aculeata, *Sw. in part* (*Agardh*).

Hab. West Indies: St. Vincent, *L. Guilding, in Herb. Hook.*; Martinique (*Herb. Paris, and Richard*).—Agardh considers this may be, as *Pt. aculeata* is

described to be, an arborescent Fern, and that it has been confounded with that species. There are a very few black spinescent tubercles on the glossy stramineous upper extremity of the stipes, as if the lower portion might like that be much aculeated. In the general form of the pinnæ it certainly very much resembles our *Pt. Kunzeana*, but these are of a much more pellucid and somewhat succulent character, of a pale green colour, as if grown under the shade of trees: yet I cannot agree with the excellent Agardh in its being "distinctissima species." The venation, which he dwells upon, does not appear to me to differ in any essential respect from that of its allies.

112. Pt. (Litobrochia) *microdictyon*, Fée; "fronds pinnato-pinnatifid, rachis subtrigonous channelled on the superior side, pinnæ pinnatifid acuminate shortly petiolate alternate, segments lanceolate falcate slightly dilated at the base obtuse crenated spreading at the sinus, basal areole narrow the rest of the areoles minute, sporothecia thick not extending to the margin, indusium very narrow spurious receptaculiform the margin thick and black, sporangia elliptical, annulus 18–20-articulated, spores trigonous blackish, sporangiastra intestiniform."—Litobrochia microdictyon, *Fée, Gen. Fil. p.* 138.

Hab. Philippine Islands, *Cuming.*—A tall Fern, ovoid in circumscription; stipes reddish.—This is placed next to *Litobrochia setifera* by M. Fée; of its exact affinities I am ignorant, as I am also of the following species of M. Fée.

113. Pt. (Litobrochia) *Borbonica*, Fée; "fronds pinnato-pinnatifid, stipes yellowish, above broadly canaliculate, pinnæ pinnatifid sessile terminal ones wider on long pedicels acuminated serrated at the apex, segments deeply divided lanceolate rather obtuse crenulate at the apex, sinus narrow, nervils slender not reaching the margin thickened at their apices, areoles of the pinnæ arcuate extended (*extensis*) those of the segments subhexagonoid, rhizome creeping an inch long fibrillose, sporothecia short, indusia broad membranaceous, receptacle none, sporangia elliptical large, annulus 18–20-articulated (*articulis discretis spissis*) intensely red, spores large trigonous opaque, sporangiastra none."—Litobrochia Borbonica, *Fée, Gen. Fil. p.* 136.

Hab. Bourbon, *Fée.*—"Filix insignis, siccitate flavidula, nervillis tenuibus rufescentibus, delicatula, translucida, glaberrima, segmentis eleganter crenulatis."

114. Pt. (Litobrochia) *Montbrisonis*, Fée; "fronds very ample, pinnules ovato-lanceolate sessile, segments lanceolate obtuse entire sinuated unequal slightly curved (*curvulis*) glabrous and pellucid, stipes and mesoneure reddish, sporothecia not extending to the margin (*marginem non attingentibus*), indusium broad, receptacle none, sporangia elliptico-

oblique large, pedicel very broad, annulus broad 18-20-articulated, spores rather large irregular trihædral amber-coloured margined." Litobrochia Montbrisonis, *Fée, Gen. Fil. p.* 137.

Hab. Bourbon, *Montbrison.*—"Filix insignis, siccitate flavidula, nervillis tenuibus, rufescentibus."

115. Pt. (Litobrochia) *camptocarpa,* Fée; "fronds 3–4-pinnate ample, rachis stramineous-yellowish glabrous 3-sulcate, pinnellæ sessile long-acuminate the apex sterile, segments abbreviated distinct curved obtuse ovate separated by a broad obtuse sinus, the apex serrated sterile, mucro spinescent rigid, basal areoles narrow flexuose, nervils slender coloured, sporothecia curved, indusium thick rather broad, sporangia elliptical, annulus 20–22-articulated, spores trigonous smooth, hairs of the sporothecia (sporangiastra?) citron-coloured subtorulose and constricted."—Litobrochia camptocarpa, *Fée, Gen. Fil. p.* 137. Pt. (Litobrochia) Orizabæ, *Klotzsch, in Linnæa,* xx. *p.* 342 (*not Galeotti*).

Hab. Columbia, colony of Tovar, *Moritz, n.* 47.—"A large glabrous Fern, greenish when dry."

116. Pt. (Litobrochia) *Tussaci,* Fée; "fronds ample bipinnate, rachis glabrous reddish subcanaliculate in the upper portion narrow and winged, pinnæ alternate shortly stipitate acuminate, segments falcate acute serrato-mucronulate, nervils sculpturate, the larger are long-petiolate, sporothecia basal, indusium broad, the margin receptaculiform, sporangia ovate, annulus 18-articulated, spores irregularly trigonous, sporangiastra intestiniform citron-coloured constricted."—Litobrochia Tussaci, *Fée, Gen. Fil. p.* 138.

Hab. St. Domingo, *De Tussac.*

117. Pt. (Litobrochia) *grandis,* Fée; "fronds ample very smooth membranaceous (*consistance sèche*), nervils lax prominent on the superior surface, rachis whitish, pinnules deeply pinnatifid petiolate, segments lanceolate with a broad sinus between to the base of which the sporothecia extend and unite leaving the apex sterile, this apex is elongated into a soft toothed point, the intermediate pinnule is pinnatifid."—Litobrochia grandis, *Fée, Fil. 8me. Mém. p.* 75.

Hab. Mexico, near Mirador, *Schaffner, n.* 144. Cuba, *Morelet.* St. Domingo, *Tussac.*—"Toute la plante a un aspect légèrement ardoisé," Fée.

§ HISTIOPTERIS, Ag.—*Fronds decompound. Pinnules pinnatifid, lowest pair on the larger pinnæ often distant from the rest, dissimilar and stipuliform. Venation extremely variable, free, partially united, or universally anastomosing.*

118. Pt. (Litobrochia?) *incisa*, Th.; caudex subterraneous long creeping, (as in *Pteris aquilina*), fronds distant ovate long-stipitate 1–7 feet or more long membranaceous when young, subcoriaceous and paler-coloured in age often glaucous beneath, pinnæ all sessile subadnate horizontal mostly opposite especially the primary ones, pinnules oblong-acuminate more or less deeply pinnatifid, segments ovate or oblong (sterile subsinuato-dentate) or triangular, lowest ones often remote and auriculiform on the rachis, veins all free or forked or the basal ones only of the costa and costules anastomosing, involucre continuous or interrupted membranaceous entire at the edge, stipes rough and muricated at the base and as well as the rachises rich brown or stramineous glossy.—*Thunb. Fl. Cap. p.* 733. *Sw. Syn. Fil. p.* 99. *Willd. Sp. Pl.* v. *p.* 396. *Schlecht. Adumbr. Fil. Cap. p.* 44. *t.* 25. *Bl. Fil. Jav. p.* 212. *Ag. Sp. Pterid. p.* 78. *Pappe and Raws. Syn. Fil. Afr. Austr. p.* 26. Pt. elegans, *Sw. in Act. Holm.* 1817, *p.* 70. *Ag. Sp. Pterid. p.* 76. Pt. cruciata, *Kaulf. in Sieb. Syn. Fil. n.* 79. *Ag. Sp. Gen. Pterid. p.* 79. Pt. pallida, *Raddi, Fil. Bras. p.* 49. *t.* 71. Pt. nivea, *Bl. En. Fil. Jav. p.* 213? Pt. Vespertilionis, *Labill. Nov. Holl. p.* 96. *t.* 245. *Willd. Sp. Pl.* v. *p.* 400. *Br. Prodr. Nov. Holl. p.* 154. *Ag. Sp. Pterid. p.* 80. *Hook. fil. Fl. Antarct.* i. *p.* 110. *Fl. Nov. Zeal.* ii. *p.* 26. Pt. Australasica, *Desv. Prodr. p.* 302. Pt. flavescens, *Colla, Plant. Rar. Ber. p.* 37. Litobrochia, *Pr.; Fée; J. Sm.; Th. Moore.* L. appendiculata? *Cl. Gay, Fl. Chil.* vi. *p.* 491 (*not Kaulf.*).—*β. gigantea;* scandent, 30 feet long.

Hab. Cape of Good Hope, *Thunberg, Mundt and Maire, Carmichael, Zeyher, n.* 4620, *Drége, Pappe and Rawson.*, Tristan d'Acunha (veins *all* free: and is Pt. Vespert., *δ. Carmichaeliana*, Ag.). Ascension Island, dwarf, stipes purple-brown, fronds matted, forming a pale-green, brittle, glaucous mass, covering many acres of ground on the weather slopes of Green Mountain, alt. 1200 to 1800 feet, *J. D. Hooker, Seemann, n.* 2660. Mauritius, *Bory, Telfair, Bojer, Wallich* (Pt. sinuata, *Wall.*). Eastern Bengal: Sikkim, *Hook. fil. and Thomson, n.* 152, and 152 *b*, the latter with more anastomosing venation, like *Pt. aurita*, Bl.; Khasya, *Griffith.* New South Wales and Tasmania, *Labillardière, Brown, J. D. Hooker, R. Gunn, etc.* Mount Disappointment, Victoria, *F. Mueller* (generally larger, veins a little more anastomosing). New Zealand, North and Middle Island, abundant as far south as Akaroa, *Dr. Lyall.* Lord Auckland's Group, and Campbell's Island, *J. D. Hooker.* Otaheite (?), *Morrenhout* (fide Ag.). Juan Fernandez, *Douglas, Scouler, Cuming, n.* 1324. *Bertero, n.* 1666 (*common form*, Pt. flavescens, *Colla*). Galapagos, *Capt. Wood, R. N.* West Indies: Jamaica, *Dr. Bancroft, M'Fadyen;* Guadaloupe, *L'Herminier.* South America, Venezuela, *Fendler, n.* 93.—*β. gigantea;* "climbing, 30 feet long," stipes as thick as one's finger, primary pinnæ

with lowest pair of pinnules very remote from the rest, suborbicular, auriculiform, adnate and appressed to the main rachis: in other respects not different from the common form. New Granada, near Chue-Chue, *Purdie*; Antioquia, Prov. Cundinamarca; ultimate pinnules two inches long, often quite entire, linear oblong, stipes and rachis very pale straw-colour, apparently a large plant, *Jervise*.

Here we have again an example of a widely diffused Fern, receiving a great variety of names, from an opinion not a little prevalent, that species are more local than they really are. It is indeed a variable plant, and yet it has a peculiar aspect not difficult to recognize. In an immature living state the fronds seem to have been thick and fleshy, and they dry of a blackish-green colour; when mature, they are firm and rigid, and in texture (and somewhat in habit) approach the *Pteris aquilina* or *Ornithopteris* group. But the most remarkable feature of the plant is the heteromorphous venation. Sometimes entire specimens have invariably free venation; sometimes there will be seen next the costa or costules one or more of the adjacent veins anastomosing. In Dr. Hooker's Sikkim specimens, marked 152 *b*, the anastomosing of the veins is nearly as constant as in *Pt. aurita*, almost indicating a passage from *Pt. incisa* to that, our next species. Mettenius has very correctly figured the venation of both these. I have selected Thunberg's name (*Pt. incisa*) as the oldest of the many before me, though it is more generally known under that of *Pt. Vespertilionis*, because that was accompanied by the first published figure: and many of the Ferns cannot be correctly determined without figures.—The most remarkable state of this species is our β. *gigantea*, which is scandent, and 30 feet long. We shall find a closely allied species (*Pt. sinuata*, Brackenr., our n. 120) to be subscandent and 18 feet long!

119. Pt. (Litobrochia) *aurita*, Bl.; caudex long creeping subterraneous, fronds ample submembranaceous distant ovate long-stipitate glaucous beneath tripinnate, pinnæ all sessile subadnate mostly opposite horizontal, pinnules opposite sessile lanceolate obtuse more or less deeply lobed and pinnatifid, segments ovate or oblong (sterile ones subsinuate) or triangular, lowest one often remote and forming auricles on the rachis, superior ones confluent, veins all anastomosing, areoles next the costa and costules the largest and most elongated, involucres continuous or interrupted membranaceous entire at the edge, stipes (upper portion) and rachises castaneous very glossy.—*Bl. En. Fil. Jav. p.* 213. *Metten. Fil. Hort. Bot. Lips. p.* 59. *t.* 14 (*excellent*). Pt. Brunoniana, *Endl. Prodr. Fl. Norfolk. p.* 12. *Ag. Sp. Gen. Pterid. p.* 79. Pt. Morrenhoutiana?, *Ag. Sp. Gen. Pterid. p.* 79 (*as to descr. and specim. in Herb. J. Sm.*).

Hab. Java, *Blume*. Luzon, *Cuming, n.* 192. Moulmein, *Lobb*. Borneo, *Wallace*. Ceylon, *Mrs. Gen. Walker*. Khasya, East Bengal, *Griffith*. Norfolk Island, *Ferd. Bauer, All. Cunningham*, margins of watercourses; *Dr. Falconer, C. J. Simmons, Esq.* Tanna, New Hebrides, *Milne*. Otaheite (?), *Morrenhout*.—Dr. Hooker, in his 'Flora Novæ Zelandiæ,' unites this with *Pt. incisa* (Pt. Vespertilionis, *Labill.*), and I am ready to allow that some of his specimens of the latter, from Sikkim, are in favour of such a union. Our Norfolk Island specimens are uniformly larger than *Pt. incisa*, the colour is a darker green even in the mature fronds, and the venation is always anastomosing. It would, too, be difficult to say whether it is not as much allied to the following (*Pt. sinuata*,

Brackenr.) as to the preceding species (*Pt. incisa*, Th.). If I am correct in referring Agardh's *Pt. Morrenhoutiana* here, it is a native of Otaheite as well as of Norfolk Island. A small specimen so marked, from Otaheite, in Mr. J. Smith's Herbarium seems to be the same. The Tanna plant, from the Voy. of H.M.S. Herald, is identical with the Norfolk Island specimens. Mettenius's figure of *Pt. aurita*, Bl., admirably represents our plant.

120. Pt. (Litobrochia) *sinuata*, Brackenr.; caudex long creeping subterraneous, fronds scandent ample (18 feet long) submembranaceous dark green glaucous beneath tripinnate, pinnæ opposite or nearly so sessile (sometimes petiolate from the suppression of the lower pair of pinnules) primary ones 1–2 feet long, pinnules sessile broad-lanceolate 2–6 inches long 1–2 inches broad excised at the lower base entire sinuate or more or less deeply pinnatifid with rounded or ovate segments, lowest pair of pinnæ often remote and auriculiform upon the rachis, sometimes quite orbicular and adnate, sometimes suppressed on one or both sides, terminal one confluent, veins all copiously anastomosing to the very margin, basal ones next to the costa and costules elongated forming arches, the rest of the areoles suboval or oblong, sori continuous from the base nearly to the apex, stipes and rachises castaneous very glossy.—Litobrochia sinuata, *Brackenr. Fil. of U. S. Expl. Voy. p.* 110. *t.* 14.

Hab. Ovolau, Feejee Islands, in thickets, at an altitude of 2000 feet, *Brackenridge, Milne in Denham's Voyage of H.M.S. Herald, n.* 290; *Dr. Lyall*, from Voy. of Captain Erskine, R.N. Angau (same group), *Milne, n.* 263. Aneiteum, *M'Gillivray and Milne.*—Mr. Brackenridge has given an excellent plate of this Fern in the Bot. of the U. S. Voyage above quoted. He describes it as a Fern which is subscandent, 18 feet and upwards in height. Dr. M'Gillivray notices it as "climbing in woods, on mountains, with the habit of *Lygodium*." This habit, together with the large size of the pinnules and their uniformly anastomosing venation, would seem to be sufficient for keeping it distinct from *Pt. incisa* (*Vespertilionis* of most authors), were it not for the *Pt. Brunoniana*, which, though in general appearance closer allied to the last mentioned than to this, does partake too much of the characters of both to enable one to come to a definite judgment.

121. Pt. (Litobrochia) *Currori*, Hook.; tripinnate? pinnæ large 1½–2 feet broad-ovate submembranaceous scarcely glaucous beneath, pinnules subopposite broad-lanceolate acuminate a span long quite sessile the lower half or two-thirds sinuate or deeply pinnatifid, veins all copiously anastomosing, areoles or arches next the costa very long and narrow and solitary (one between each pair of costules) those next the costule large, the rest smaller and broad oval, sori continuous or interrupted, rachises pale-brown scarcely glossy and slightly hairy beneath, pinnules deeply pinnatifid, seg-

ments long and acuminated. (TAB. CXL.)—*β*. pinules almost a foot long glabrous slightly glaucous beneath sinuato-lobate with mostly obtuse lobes.

Hab. Western Africa, south of the tropics, *Dr. Curror.*—The late Dr. Curror collected these in Western Africa in or near Elephant's Bay, about lat. 32° S., but large as our specimens are they have the appearance of being at most only primary pinnæ: they exhibit nothing of the ramification of the entire plant. Nor am I sure that I am correct in placing it in this group, or section, of which it wants the entirely glabrous and glossy rachises, yet our specimens of var. *β* have so much the general appearance of *Pt. sinuata*, Brackenr., that at one time I was disposed to consider them specifically the same.

122. Pt. (Litobrochia) *stipulacea*, Hook.; frond ample bipinnate, pinnæ a foot and a half long opposite long-petiolate, petioles swollen at the base and furnished at the anterior base with a pair of orbicular foliaceous appressed auricles or stipules, pinnules (6 inches long) remote petiolulate gradually acuminate quite entire obliquely cuneate at the base, terminal one and lowest pair subhastate chartaceous opaque pale and subglaucous beneath where the costa is prominent, veins copiously and nearly uniformly anastomosing forming oblong 6-sided areoles having an obliquely patent direction those next the costa rather the largest, involucre continuous narrow firm almost the texture of the frond, stipes (portion only) and rachises and costa beneath rich castaneous very glossy.

Hab. Mountains of Sarawak, Borneo, elev. 2700 feet, *Thos. Lobb.*—A pair of pinnæ and a portion of the stipes are all I possess of this very beautiful and very distinct species of *Pteris*. I refer it with little hesitation to the *Histiopteris* (or *Vespertilio*) section, although it has pinnules so much larger, longer than, and different in shape from, any known of that group. The very remote petioles of the pinnæ (almost invariably sessile in the described species of this group) would seem to militate against such an opinion, but if the stipules are to be considered as reduced pinnules, which is probably the case, or auricles, we have a feature common to others of the group. The two pinnæ in our possession are nearly a foot and a half long, exactly opposite, broad ovate in circumscription, again pinnate with very remote nearly opposite petiolulated pinnules 2–3 inches apart. Petioles much swollen at the base, and furnished on the anterior side with a pair of circular, foliaceous, appressed stipules, 2–3 lines broad. Pinnules from 5 inches to a span long, on petiolules 1–3 lines long, linear-lanceolate, gradually acuminate, obliquely cuneate at the base, rarely (terminal and inferior ones) subhastate, or sometimes imperfectly lobed. The venation is throughout copiously reticulated (no free veins), the areoles oblong. Stipes and rachises rich chestnut-colour, very glossy, as if varnished, and there is an indication of their being (as well as the under side of the pinnules) glaucous when recent.

§ AMPHIBLESTRA.—*Primary veins pinnated, remote; these are connected by lesser transverse curved ones, and the interstices are occupied by reticulated veinlets, in the areoles of which are free, straight or curved branches.*

123. Pt. (Amphiblestra) *latifolia*, H.B.K.; frond ample

membranaceous trifoliolate, lower pinnules opposite broad-oblong acuminate obliquely truncate at the base and nearly sessile, intermediate one very large long-petiolate subcordate trifid, its lateral segments oblong acuminated, intermediate one very large ovate acuminated sinuato-lobate, sori narrow continuous even to the apices.—*H.B.K. Nov. Gen. et Sp. Am.* i. *p.* 14. *Willd. Sp. Pl. p.* 370. *Kze., in Schkh. Fil. Suppl.* ii. *p.* 43. *t.* 118. Amphiblestra latifolia, *Presl, Tent. Pterid. p.* 150. *t.* 6. *f.* 1. *Hook. Gen. Fil. Suppl. t.* 120 *C. Fée, Gen. Fil. p.* 140. *t.* 11 *B. f.* 1, 4, 8.

Hab. Venezuela: Quebrado del Cuchivano, near Cumanacoa, *H.B.K.*: mountains of Caripe, elev. 3000 feet, *Funck, n.* 201.—In the venation of the frond this section (Genus *Amphiblestra*, Presl) corresponds with the section (or Genus) *Gymnopteris* in *Acrosticheæ*, *Drynaria* in *Polypodieæ*, etc. The only species known to us, is a very fine one, and apparently of rare occurrence. Presl has indeed an *Amphiblestra? longifolia*, Tent. Pterid. p. 157, but a name only, for I am not aware that it is anywhere described.

[Obs. Of the Genus *Pteris*, as above considered, very many other supposed species might have been enumerated, but so imperfectly described that it would only have encumbered our pages with useless names, of the very affinities of which species we are wholly ignorant. We fear that more than enough of dubious species are already recorded, nor are we over-confident as to the permanency of some of our own. But we have endeavoured, by our diagnoses and remarks, and, as much as our work would admit, by figures, to render them intelligible to the student.]

11. Ceratopteris, *Brongn.*

Ceratopteris, "*Brongn. Bullet. Soc. Philom. p.* 184, *cum ic.* (1821)." (Hook. Gen. Fil. tab. XII.) Teleozoma, *Br. Bot. App. to Frankl. first Journey to the Polar Sea* (1823), *p.* 54. Ellobocarpus,* *Kaulf.* "*Entw. d. Fahrenkr.*" Furcaria, *Desv.* (1827). Acrostichum, *Linn.* Pteris, *Sw. Willd. Beauv.* Parkeria (Hook. Gen. Fil. (1825) tab. L.)

* I have been at some pains to ascertain which of the above generic names has the right of priority, and should have determined unhesitatingly in favour of *Ceratopteris*, Brongn., were it not that Gaudichaud (Voy. de l'Uranie, Bot. p. 393) dates the publication of *Ellobocarpus*, Kaulf., as 1819, though the only *authority* he gives for the name is *Kaulf. Enum. Fil. p.* 147, a work which bears date "1824," nor do I, in other writers, find reference to it under any prior date. It is true that Kaulfuss himself, in his Enumeratio Fil., quotes "Ellobocarpus, *Kaulf. Entw. d. Fahrenkr. f.* 7, 8, 9," but I can find no publication with that exact title. I possess, indeed, from the author, a volume entitled 'Das Wesen der Farrenkräuter, etc.—und mit einer Darstellung der Entwickelung der *Pteris serrulata*,' etc., von Dr. G. N. Kaulfuss; and in the accompanying plate are "ff. 7, 8, 9, *Ellobocarpus oleraceus*, Kaulf.," but this bears date 1827. I am therefore still bound, under correction, to consider *Ceratopteris* as the oldest name.

Sori continuous, arising from two principal longitudinal but slightly anastomosing veins or *receptacles* on each side between the costa and the margin. *Capsules* lax, scattered on the receptacles, subglobose, sessile, obscurely reticulated; *annulus* very broad, nearly complete, or reduced to five or six indistinct articulations, or quite obsolete. *Involucre* membranaceous, continuous, formed of the reflexed margins of the frond, which are broad, and meet at the back. *Seeds* or *spores* few, very large, obtusely trigonal, each of the three faces beautifully concentrically striated, filled with an oleaginous substance.—*Tropical aquatic* Fern, *floating, or attached to soil in shallow waters, very peculiar in habit and mode of growth, and extremely variable in form.* Roots *tufted.* Fronds *membranous, subsucculent when fresh, pellucido-punctate when dry. Sterile and fertile different, several from the same root, proliferous in every part.* Sterile *subfoliaceous, simple or more or less divided: young and less divided ones horizontal and floating; more advanced, bi-tripinnate and much dissected, emerged, erect;* veins *all anastomosing.* Fertile ones *generally taller than the sterile, bi-tripinnate, with linear, obtuse, somewhat siliquose* segments, *everywhere soriferous.* Stipites *in both, thick, inflated, with large air-cells.*

1. Ceratopteris *thalictroides.*

Ceratopteris thalictroides, *Brongn. l. c. Hook. Gen. Fil. l. c. Wall. Cat. n.* 83. *Brackenr. Fil. U. St. Expl. Exped. p.* 67. Pteris thalictroides, *Sw. Syn. Fil. p.* 98. *Willd. Sp. Pl.* v. *p.* 378. Acrostichum thalictroides, *Linn. Sp. Pl. p.* 1527. *Fl. Zeyl. n.* 371. *t.* 4. Acrostichum siliquosum, *Linn. Sp. Pl. p.* 1527. *Fl. Zeyl. n.* 376. *Amœn. Acad.* i. *p.* 270. *f.* 3. Teleozoma thalictroides, *Br. in Frankl. Journ. l. c. p.* 54. Ceratopteris Gaudichaudii, *Brongn. in Frey. Voy. Bot.* i. *p.* 393. *t.* 20 (*small fertile fronds only*). Ceratopteris Richardii, *Ad. Juss. Dict. Class. d'Hist. Nat.* iii. *p.* 531. Pteris cornuta, *Beauv. Fl. d'Oware et de Ben. p.* 63. *t.* 38. *Le Prieur, Ann. des Sc. Nat.* xix. *p.* 99. *t.* 3 (*young proliferous fronds, capsule, and spores*). Pt. succulenta, *Roxb. in Cal. Journ. of Nat. Hist.* iv. *p.* 508. Ellobocarpus oleraceus, *Kaulf. En. Fil. p.* 148. Belvisia siliquosa, *Mirb.* Parkeria pteridioides, *Hook. Exot. Fl. t.* 147 *and* 231. *Hook. et Grev. Ic. Fil. t.* 97. Ceratopteris Parkeri, *J. Sm. Metten.* Parkeria Lockhartii, *Hook. et Grev. l. c. under t.* 97. Millefolium aquaticum, *Rumph. Amb.* vi. *p.* 176. *t.* 74. *f.* 1. Planta siliquosa, *Pluk. Alm. t.* 15. *f.* 3.

Hab. Tropical and subtropical regions, Asia, Africa, and America, growing in quiet or slightly current waters. India: abundant in the "Gheels" and other still pools, frequently such as are occasionally dry, in all the warm regions, from Punjaub (*Jacquemont*), in the north-west to the extreme south, *Wallich, Griffith, Wight, Hooker and Thomson, etc.;* and to Chittagong in the east, *Hooker and Thomson*, and Moulmein, *Rev. C. S. P. Parish;* Singapore, *Wallich;* Penang, *Norris.* Java, *Blume.* Luzon, *Brackenridge.* Isle of Negros (Philippines), *Cuming, n.* 344. East coast of Timor, *All. Cunningham.* Ladrones, *Gaudichaud.* Hongkong, *Dr. Lorraine.* Tropical Australia: S. Goulburn Islands, *All. Cunningham;* Roper's River, Gulf of Carpentaria, *Ferd. Mueller.* Africa: "in salt waters not far from the sea," Oware, *Palisot de Beauvois;* turfy and marshy places, Senegambia, *Leprieur, Brunner.* Madagascar, *Boivin.* Tropical America: French Guiana, *Richard, Leprieur;* British Guiana, *C. S. Parker.* West Indies: Jamaica, *N. Wilson;* St. Vincent, *Dr. Wright;* Trinidad, *Lockhart, Purdie.* Brazil, *Gardner, n.* 344, 5667, 6111, 1239, *and* 4397. Bahia, *Saltzman.* New Granada, *Goudot.* Santa Martha, *Purdie.* Mexico, province of Oaxaca, *Liebmann.*

This highly curious aud, in form, extremely variable aquatic Fern, has been greatly misunderstood as to its genus and its specific limits, and I plead guilty in having myself contributed to this misunderstanding. I have constituted a new Genus of what I am now satisfied is a legitimate *Ceratopteris* of Brongniart, and I have made two species, both of which may safely be allowed to merge into the *C. thalictroides*, Brongn. (the old *Acrostichum thalictroides*, Linn.). My genus in question, *Parkeria*, was founded upon an aquatic Fern of British Guiana, which I received from my friend C. S. Parker, Esq., in 1824, a period of time when *Ceratopteris* was scarcely known to me, and when it was only known to any one as an East Indian Fern: sufficiently so, however, I believed, to justify me in constituting a new genus, and even a new Order, of *Filices*, seeing that our plant had capsules *quite destitute of annulus*, while Mr. Brown had recently characterized *Ceratopteris*, his *Teleozoma*, as having "capsulæ sessiles, *annulo completo latissimo*" (see Hook. Exot. Flora, under tab. 147). Afterwards, on figuring the same plant in the 'Icones Filicum,' from living specimens, Dr. Greville and myself detected a small and very obscure annulus, of from 4–6 articulations, yet of a nature to induce our retaining the genus, and even the Order; ignorant still of Brongniart's having previously, namely in 1821, constituted his Order *Ceratopterideæ*. On the present occasion it has behoved me to reconsider my former views, with the aid of extensive suites of specimens which had been accumulating in my herbarium, from the Old and the New World. These showed the *most perfect uniformity* of external character in *all*, so that, unless there was a real and tangible difference in the minute organs of fructification, there could be no possibility of distinguishing them. Capsules of specimens from six different and widely distant countries were submitted to the microscope, and all gradations of annulus were found, from the "*annulus latissimus completus*" of Mr. Brown, to *capsules quite destitute of ring!* Asia, Africa, and America, therefore, present one and the same species. It is then, in its more perfect form, a truly and very distinctly *annulated* Fern, and, as such, should remain among the true *Filices*. Where should its place then be, and what its affinities, are questions not easily answered. In habit, external form, and place of growth, and in the sessile capsules, in the great breadth of annulus, and above all in the few and very large and concentrically striated spores or seeds,* it is entirely *sui generis;* and if I place it among the *Pterideæ* on account of some affinity with *Llavea* and *Cryptogramme*, it is not

* "*Teleozoma* insuper insigne est sporis in ordine naturali forsan, in tribu quantum scio maximis obtuse trigonis pulchre striatis, puncto unico opaciore."—Brown in App. Frankl. Journey, l. c.

from any real similarity of habit and structure, but because I cannot find a better place, nor have other botanists who have retained it among Ferns. Fée excludes it from true *Filices*, and Presl from all the Fern alliances, even the *Pseudo-Filices*, as they are called. Brongniart considers it should rank in the tribe of *Gleicheniaceæ*. Brown alludes to it on two occasions, once (Prodr. Nov. Holl. p. 154) under *Pteris*, and again (App. to Frankl. Journ. l. c.) under his *Cryptogramme*, next to which it is placed by Desvaux; and in another place (Plant. Jav. Rar. p. 5) Brown says, "That subgeneric or sectional characters may in several instances be obtained or assisted from the seeds of this Natural Order is not improbable, and in one case, namely, *Ceratopteris* (or *Teleozoma*), including *Parkeria* in that genus, *even the generic character* (as distinguished, we presume, from *Pteris* and *Cryptogramme*) *appears chiefly to reside in the seeds*, which in their unusual size and peculiar marking or striation entirely agree in all the species of the genus, while in the original species the annulus is nearly complete; and in *Parkeria*, different from the rest of the genus in no other point whatever, the ring is reduced to a few faint striæ." Kaulfuss includes it in his *Blechnaceæ*, along with *Cryptogramme* and *Lomaria*; J. Smith in his tribe *Polypodieæ*, next after *Antrophyum*; T. Moore between *Schizæa* and *Osmunda*; Mettenius near *Polypodium*, between *Lecanopteris* and *Gymnogramme*; and, lastly, Liebmann, between *Cyatheaceæ* and *Hymenophylleæ*.

Palisot de Beauvois is probably in error in believing his *Pteris cornuta* (undoubtedly *Ceratopteris thalictroides*) to have been found in *salt* water. Neither in Africa nor elsewhere is such a locality ascribed to it by any traveller. In the Indian Archipelago this Fern is boiled and eaten by the poor as a vegetable.

N.B. The present SUBORD. IV. PTERIDEÆ, *will be continued and concluded in the early part of our next volume.*

ADDITIONS.

The following species of *Adiantum* and of *Pellæa*, discovered since the printing of those two genera was completed, are too important to be omitted in the present volume. The figures referred to will be given in Vol. III.

After Adiantum asarifolium, *p. 2 of this Volume, insert—*

2*. Adiantum *Parishii*, Hook.; small cæspitose no distinct caudex, roots few fibrous tomentose, fronds orbicular flabellate membranaceous pellucid, sterile ones crenato-dentate, fertile ones pauci-(3–5-)lobate, sinuses deep soriferous, veins originating from the base flabellato-divergent repeatedly dichotomous, stipes slender filiform ebeneous-black shining articulated at the summit. (TAB. CXLII. A. in Vol. III.) *Hook. Fil. Exot.* i. *pl.* 51.

Hab. Malay Peninsula. On a limestone, rocky mountain near Moulmein, called Twa-Kabin, at an elevation of 2000 feet above the sea, *Rev. C. S. P. Parish.*—This extremely interesting *Adiantum*, belonging to a small group of

species, of which only two kinds were yet known, and those of very limited geographical range, with simple (undivided) fronds, and from which it is abundantly distinguished in form, texture, and fructification, was discovered by my valued correspondent, a great lover of Ferns, the Rev. C. S. P. Parish, Chaplain at Moulmein. It inhabits, as far as yet known, only one spot on the said mountain, a large mass of rock, about 200 feet below the summit, very difficult of access, and *in* some lime, the result of the continued filtering and dropping of the rains from a cave above. There it is "tolerably abundant over the space of a few feet, as *Woodsia hyperborea* grows on the eastern precipice of Snowdon, in company with *Cheilanthes farinosa* and other interesting Ferns, but nowhere else has it been seen at all."

The *Adiantum Philippense*, L., which I have, following all preceding botanists, placed in this group (see p. 3 of this volume), is figured by Petiver, the original authority for the plant as pinnate, and I have little doubt but it may be safely referred to *A. lunulatum*, Sw.

After Pellæa rotundifolia, *p.* 136 *of this Volume, insert*—

7*. Pellæa *Bridgesii*, Hook.; caudex short thick creeping entangled bearing the fronds from the apex clothed with copious subulate ciliated scales, fronds 4–6 inches long oblong-lanceolate firm coriaceous very glaucous pinnated, pinnæ almost invariably opposite (15–21) broad-elliptical cordate short-petiolate very obtuse opaque, the two halves when dry reflected upon each other, veins sunk obsolete, the margin entire with a very slender but not incurved white cartilaginous edge, sori linear on the veins confluent and forming a broad line parallel and a little distance from the margin, involucre none (and no inflection of the margin upon the sori), stipites and rachis dark purple-brown glossy. (Tab. CXLII. B. in Vol. III.)

Hab. Mountains, interior of California, *Bridges*. Sierra Nevada, *Wm. Lobb.*— This is a very remarkable Fern, with much in the habit and in the nature of fructification of *Pellæa* (Platyloma, *J. Sm.*) *paradoxa*, *falcata*, and *rotundifolia*, of a singularly glaucous hue, and quite destitute of involucre. In short, as far as the sori are concerned, one can hardly see why it should not range with *Gymnogramme*, especially with *Gymn.* (Pterizoma, *Fée*) *reniformis*. In the dried state every pinna has the two halves bent back, so as to meet behind (*dorso conduplicata*). A few of the lowest ones are usually sterile, and nearly orbicular. The species is the more interesting as coming from a country so widely remote from the locality of the allied species above alluded to. It has indeed fewer traces of a real *involucre*, or indusium, than those, and tends to confirm the views of Mr. Brown respecting his *Adiantum paradoxum* (our *Pellæa paradoxa*), namely, that it is an *Adiantum* with a continuous sorus, but that sorus not inflexed, as in most of the true *Adianta*, but patent, as in the species now under consideration. Nevertheless, specimens of the closely-allied *Pellæa paradoxa* and *Pellæa falcata* do exhibit, in an immature state, the presence of an involucre, though narrow and eventually obsolete.

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B. ADIANTUM ASARIFOLIUM, *Willd.*—p. 2.
Sterile and fertile frond; *nat size.*

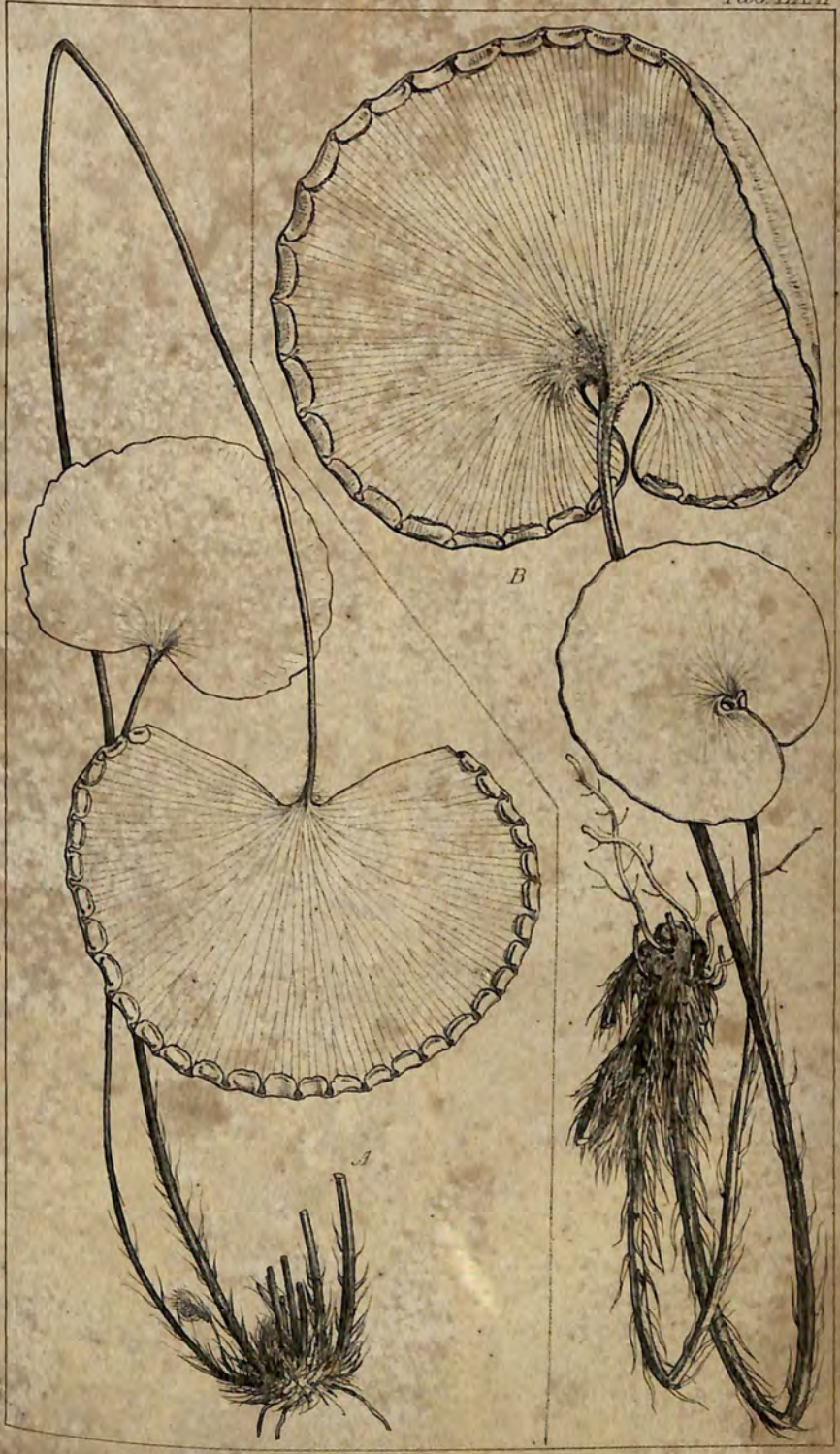
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Fig. 1. A young and entire frond. Fig. 2; *nat. size.* Fig. 2. Perfect fertile frond, one pinna removed; *nat. size.* Fig. 3. Portion of a sorus; *magnified.* Fig. 4. Portion of sterile pinna, to show the venation; *magnified.*

B. Adiantum Phyllitidis, *J. Sm.*—p. 5.

Fertile pinna; *nat. size.*

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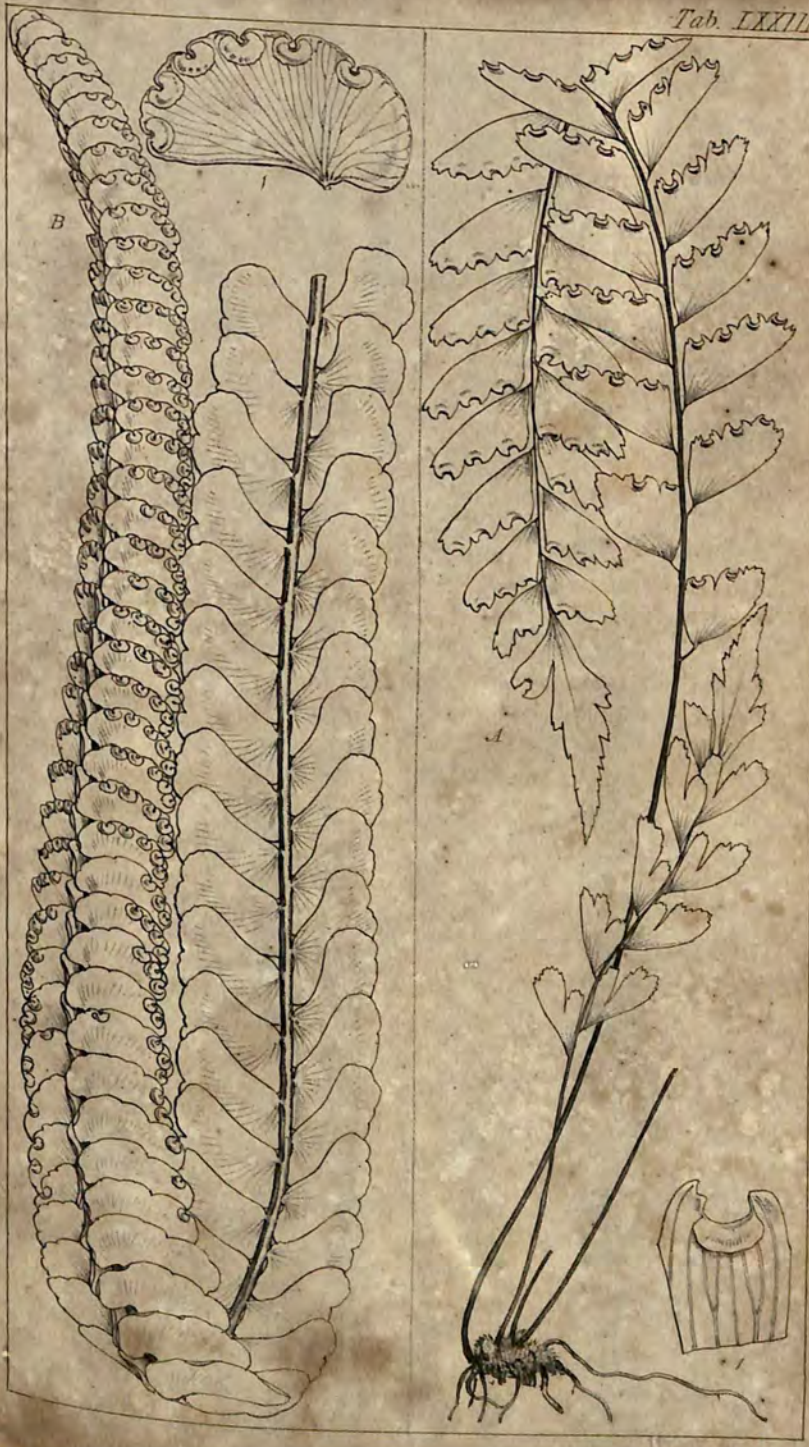
Tab. LXXIII

A. Adiantum Cubense, *Hook.*—p. 8.
Sterile and fertile frond; *nat. size.* Fig. 1. Sorus; *magnified.*

B. Adiantum Shepherdi. *Hook.*—p. 9.
Portion of the plant; *nat. size.* Fig. 1. Fertile pinna; *magnified.*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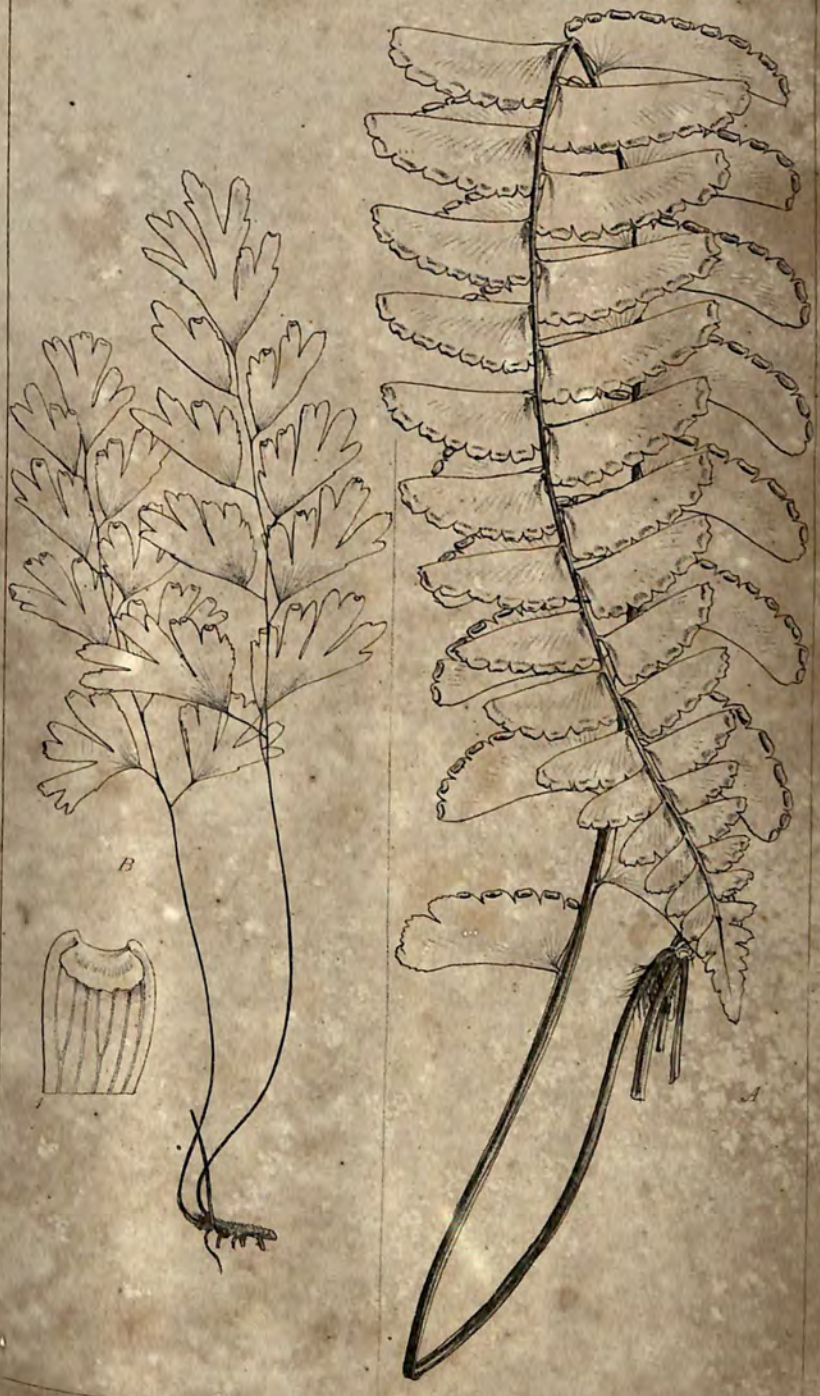
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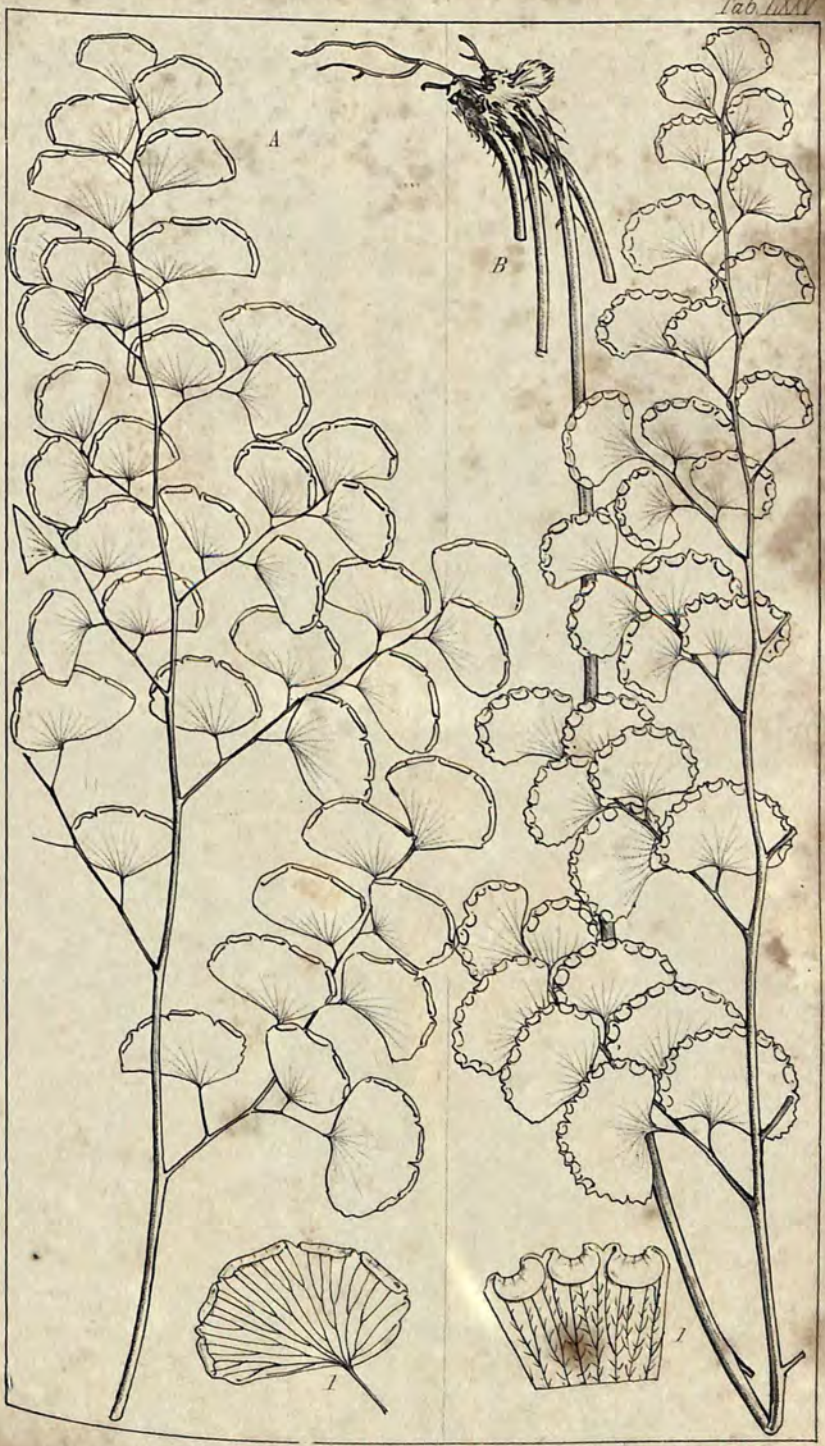
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A. Adiantum sulphureum, *Kaulf.*—p. 43.

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B. Adiantum venustum, *Don.*—p. 40.

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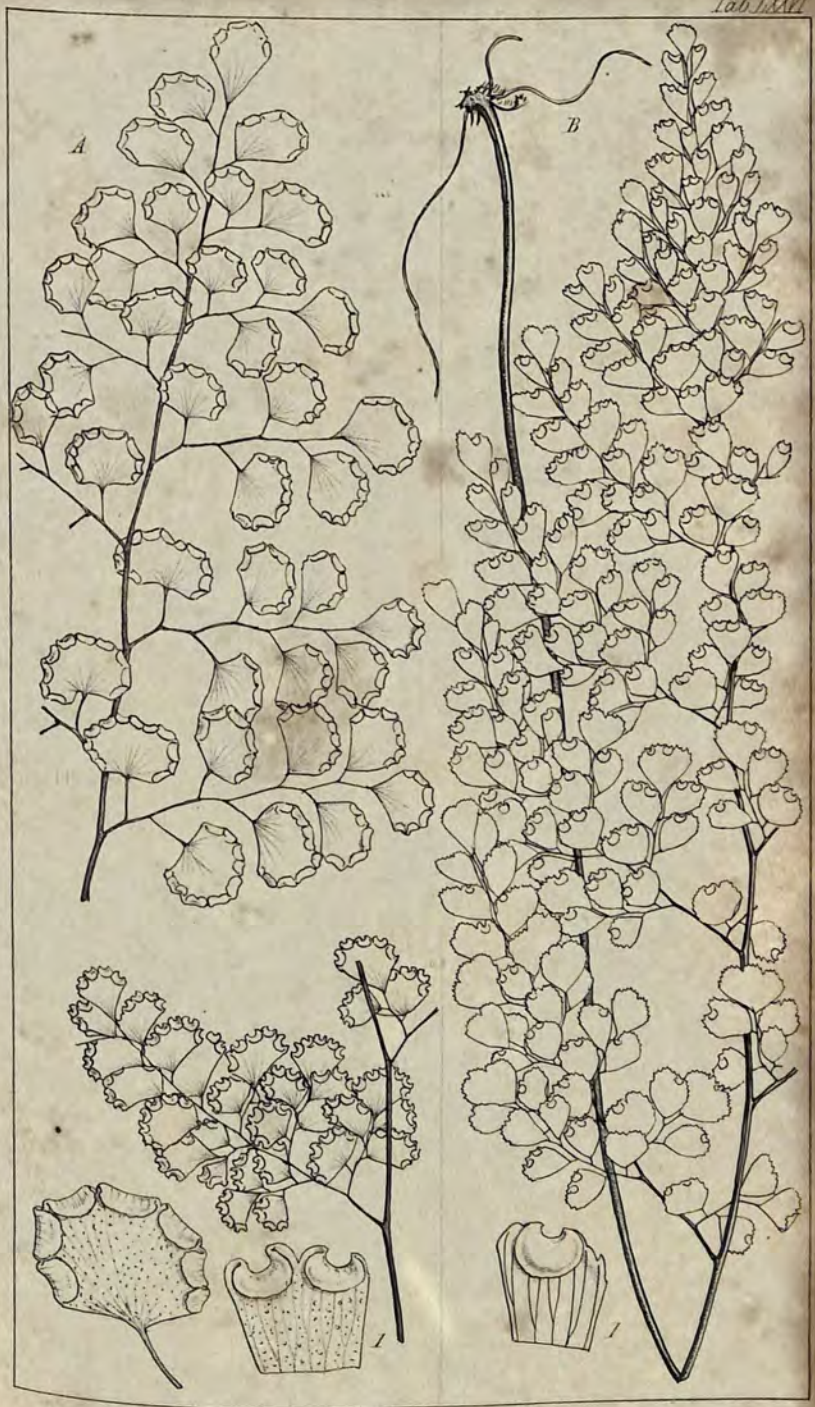
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Tab. LXXVII.

A. Hypolepis Capensis, *Hook.*

Fertile plant; *nat. size.* Fig. 1. Sterile lobe; and fig. 2, fertile lobe; *magnified.*

B. Ochropteris pallens, *J. Sm.*—p. 54.

Portion of a fertile frond; *nat. size.* Fig. 1. Fertile pinnule; *magnified.*

C. Adiantum Æthiopicum, *L.*—p. 37.

Portion of a frond; *nat. size.* Fig. 1. Fertile pinnule; *magnified.* Fig. 2. Sorus; *more magnified.*

1
2
C
2
A
1
2
2
B
1

Tab. LXXVIII.

A. Hypolepis parallelogramma, *Pr.*

Fertile ultimate pinna; *nat. size.* Fig. 1. Fertile pinnule; *magnified.*

B. Cheilanthes dealbata, *Hook.*

Upper half of a fertile frond, and a lower pinna of the same (upper side); *nat. size.* Fig. 1. Fertile lobe; *magnified.* Fig. 2. Sorus; *more magnified.*

A
1
B
1
2

Tab. LXXIX.

A. Adiantum obliquum, *Willd.*—p. 8.

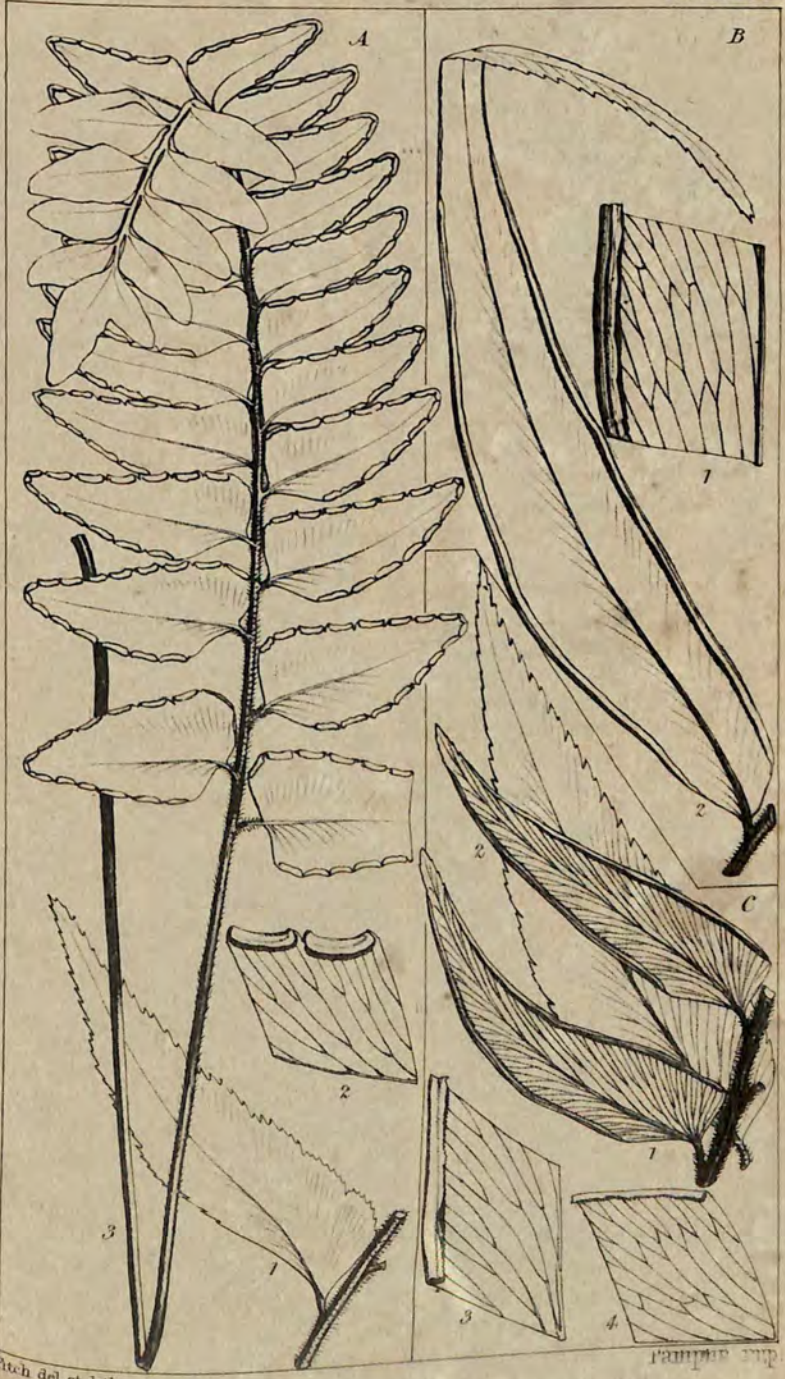
Fig. 1. Sterile pinna of var. β.; *magnified.* Fig. 2. Sori; *magnified.* Fig. 3. Fertile frond; *nat. size.*

B. Adiantum dolosum, *Kze.*—p. 6.

Fig. 1. Portion of a fertile pinna; *magnified.* Fig. 2. Fertile pinna; *nat. size.*

C. Adiantum lucidum, *Sw.*—p. 4.

Fig. 1, 2. Fertile and sterile pinnæ; *nat. size.* Fig. 3. Portion of a pinna with free veins: and fig. 4, portion of a pinna with anastomosing veins, from the same plant; *magnified.*



Fitch del et lith

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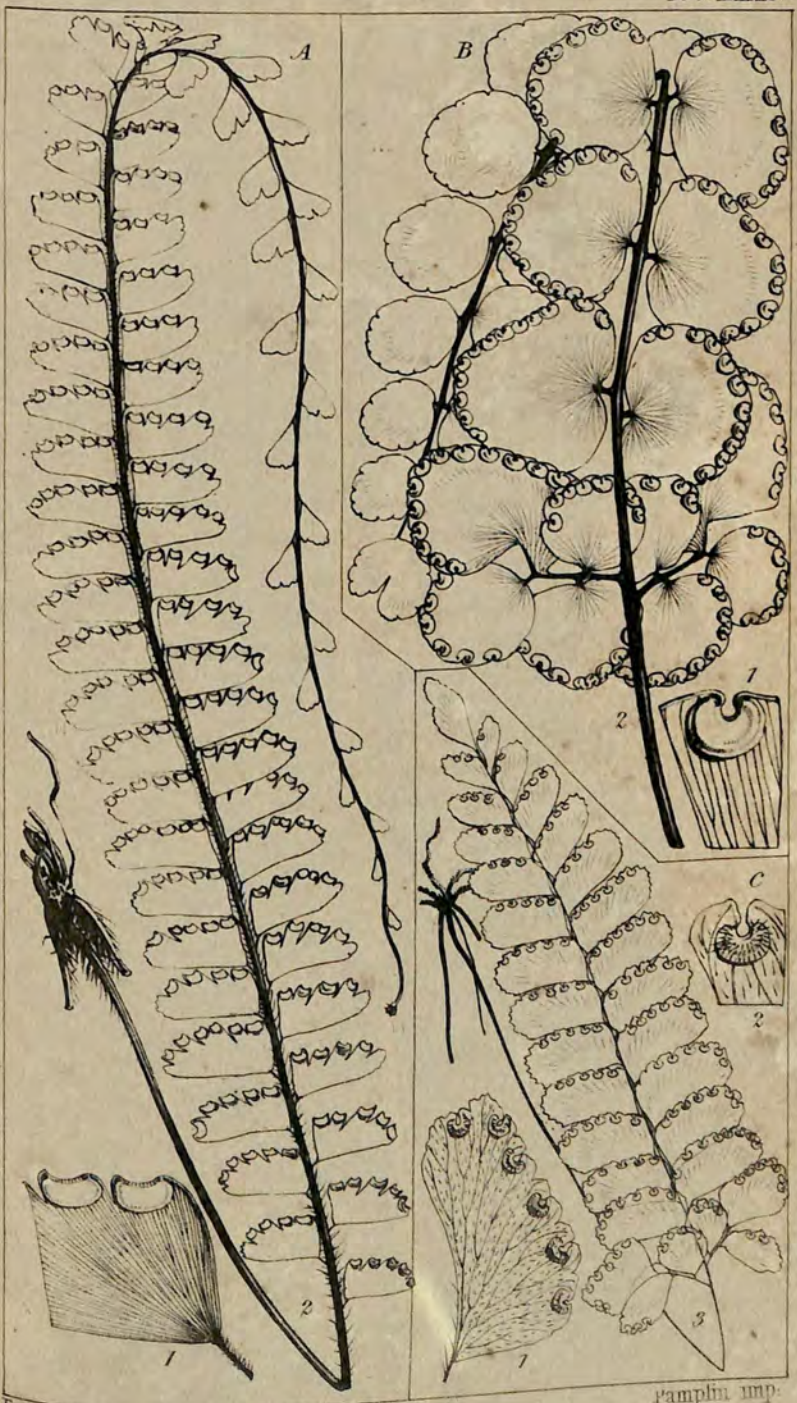
Tab. LXXX.

A. Adiantum rhizophorum, *Sw.*—p. 12.
Fig. 1. Portion of a fertile pinnule; *magnified.* Fig. 2. Fertile frond; *nat. size.*

B. Adiantum Galeottianum, *Hook.*—p. 10.
Fig. 1. Portion of a pinnule, with sorus; *magnified.* Fig. 2. Fertile frond; *nat size.*

C. Adiantum diaphanum, *Bl.*—p. 10.
Fig. 1. Fertile pinnule; *magnified.* Fig. 2. Sorus; *more magnified.* Fig. 3. Fertile frond; *nat. size.*



Fitch del et lith

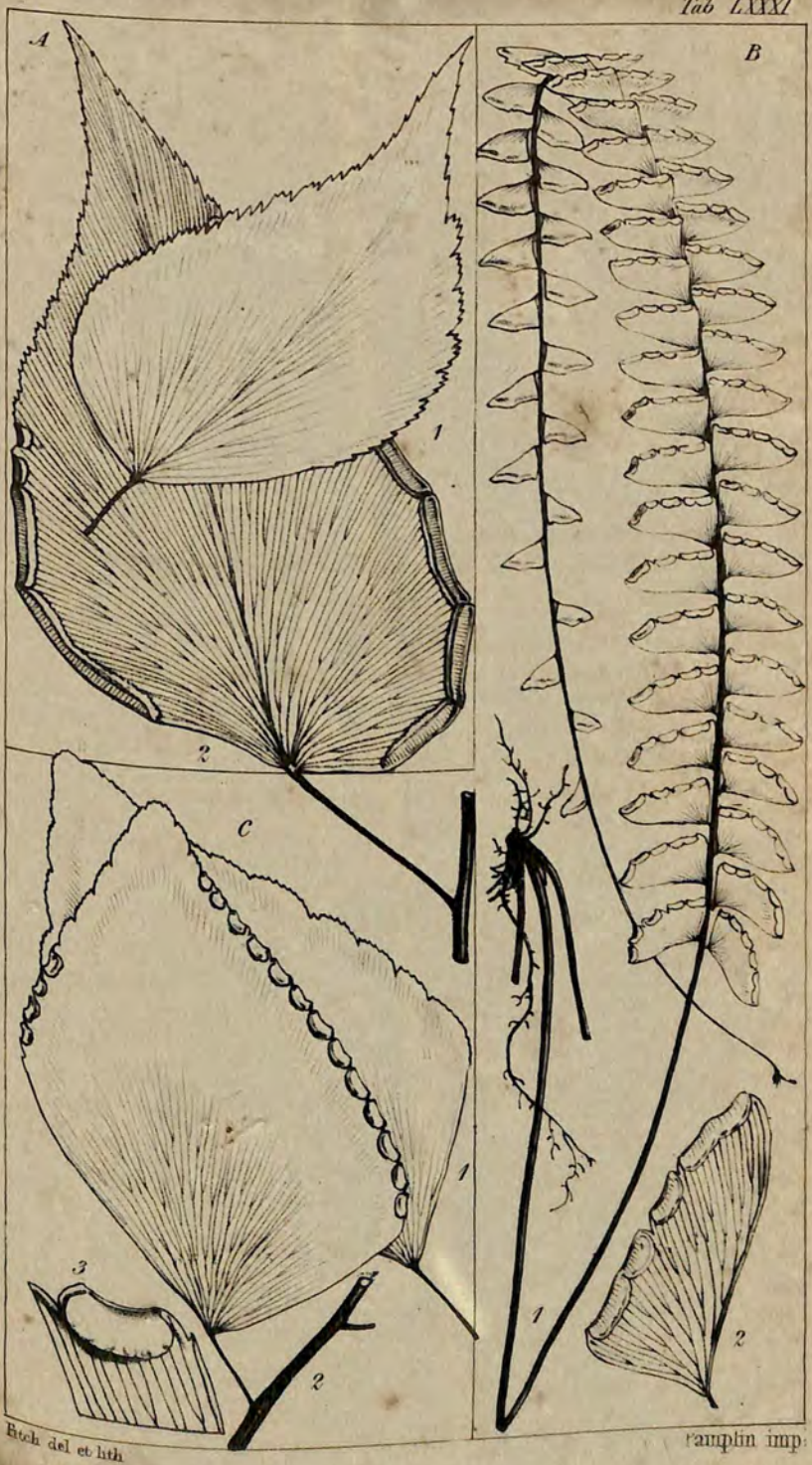
Pamplin imp.

Tab. LXXXI.

A. Adiantum Seemanni, *Hook.*—p. 5.
Fig. 1. Sterile pinnule; *nat. size.* Fig. 2. Fertile pinnule; *nat. size.*

B. Adiantum Edgeworthii, *Hook.*—p. 14.
Fig. 1. Fertile frond; *nat. size.* Fig. 2. Fertile pinna; *magnified.*

C. Adiantum Peruvianum, *Hook.*—p. 35.
Fig. 1. Sterile pinnule; *nat. size.* Fig. 2. Fertile pinnule; *nat. size.* Fig. 3. Sorus; *magnified.*



Fitch del et lith

Pamplin imp:

Tab. LXXXII.

A. Adiantum hirtum, *Klotzsch.*—p. 20.

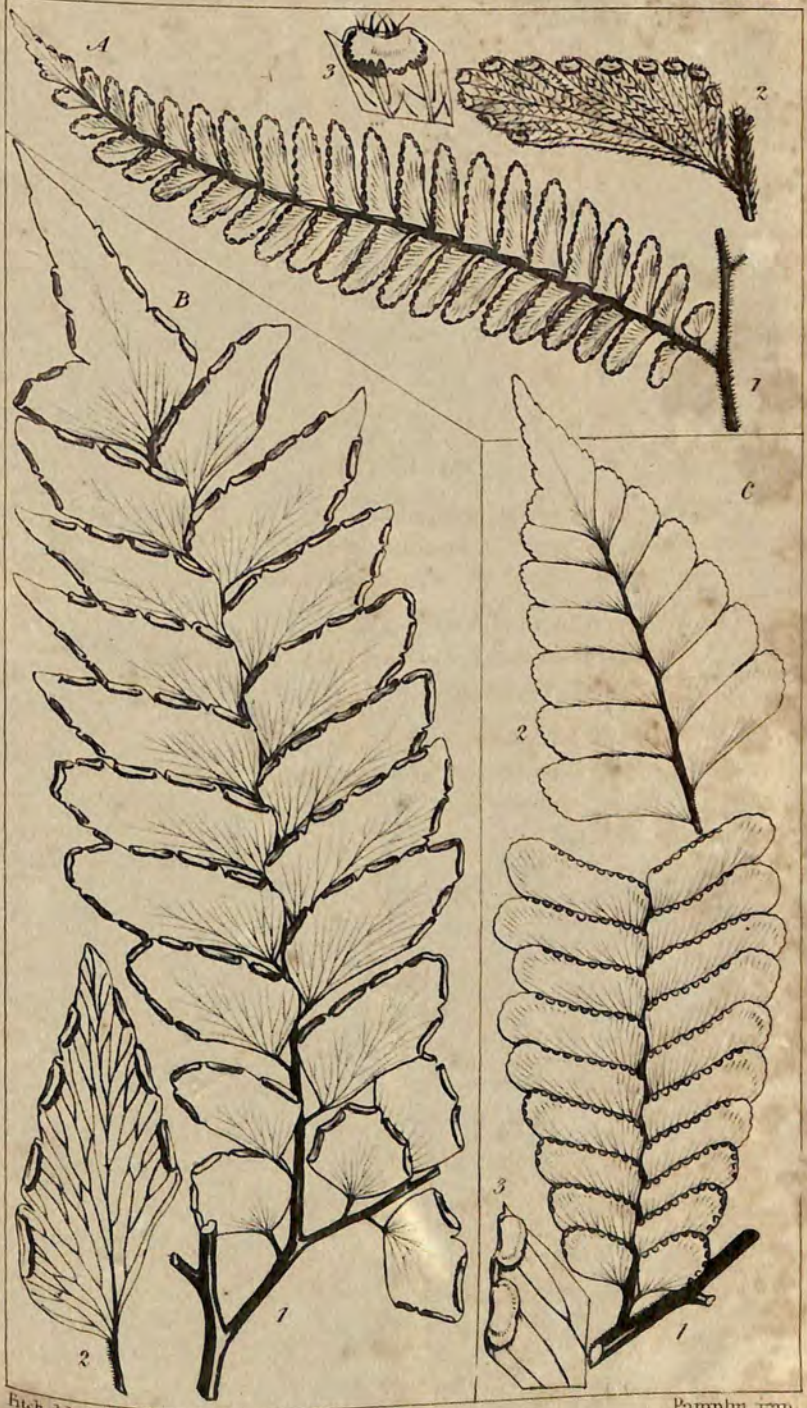
Fig. 1. Fertile pinna; *nat. size.* Fig. 2. Fertile pinnule; *magnified.* Fig. 3. Sorus; *more magnified.*

B. Adiantum Le Prieurii, *Hook.*—p. 31.

Fig. 1. Portion of a fertile frond; *nat. size.* Fig. 2. Fertile pinnule; *magnified.*

C. Adiantum Klotzschianum, *Hook.*—p. 21.

Figs. 1, 2. Base and apex of a fertile pinna; *nat. size.* Fig. 3. Sori; *magnified.*



Fitch del et lith

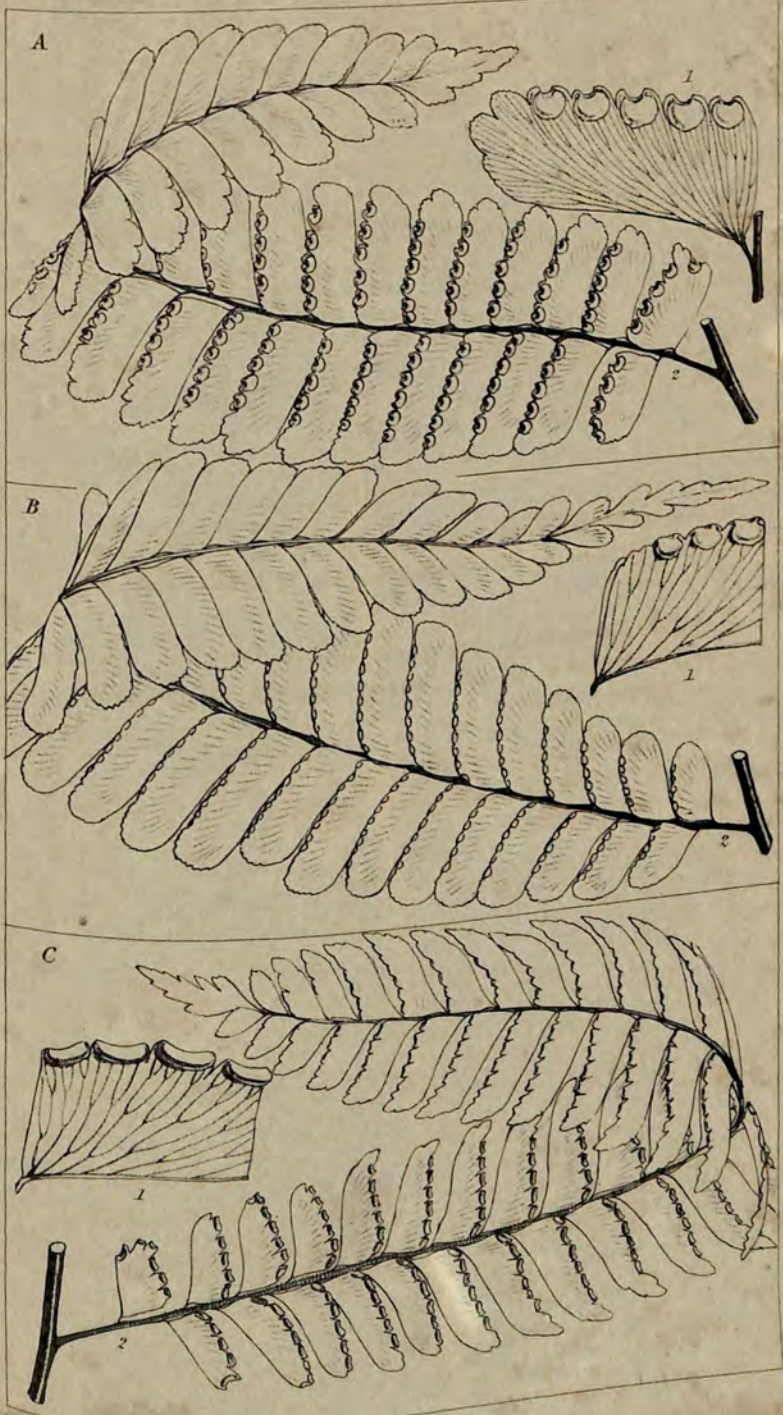
Pamphl imp

Tab. LXXXIII.

A. Adiantum cardiochlæna, *Kze.*—p. 50.
Fig. 1. Fertile pinnule; *magnified.* Fig. 2. Fertile pinna; *nat. size.*

B. Adiantum macrocladum, *Kl.*—p. 49.
Fig. 1. Portion of a fertile pinnule; *magnified.* Fig. 2. Fertile pinna; *nat. size.*

C. Adiantum Wilesianum. *Hook.*—p. 50.
Fig. 1. Portion of a fertile pinnule; *magnified.* Fig. 2. Fertile pinnule; *nat. size.*



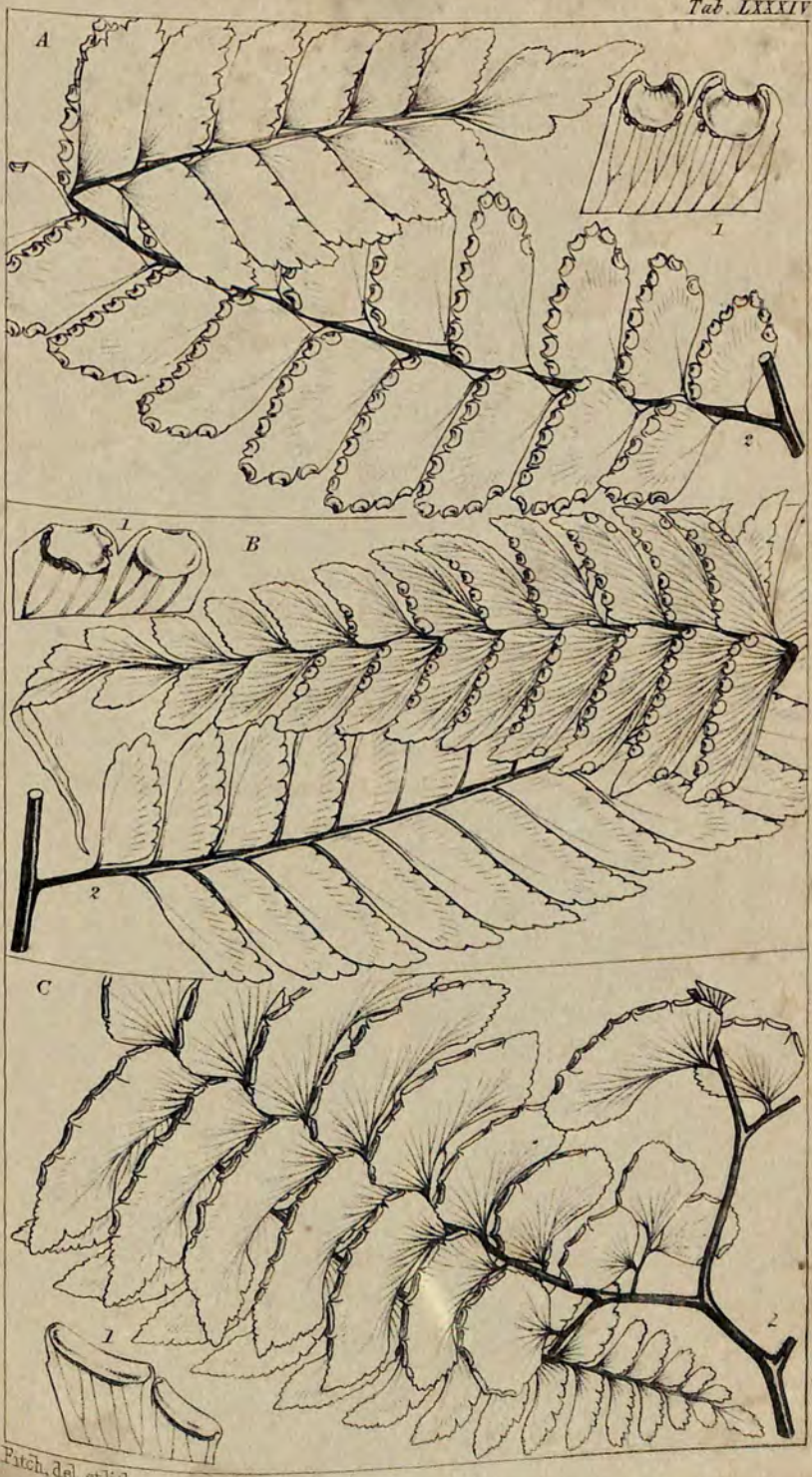
Fitch. del et lith.

Tab. LXXXIV.

A. Adiantum Mathewsianum, *Hook.*—p. 35.
Fig. 1. Sori; *magnified.* Fig. 2. Fertile pinna; *nat. size.*

B. Adiantum urophyllum, *Hook.*—p. 24.
Fig. 1. Sori; *magnified.* Fig. 2. Fertile pinna; *nat. size.*

C. Adiantum curvatum, *Kaulf.*—p. 28.
Fig. 1. Sori; *magnified.* Fig. 2. Portion of a frond; *nat. size.*



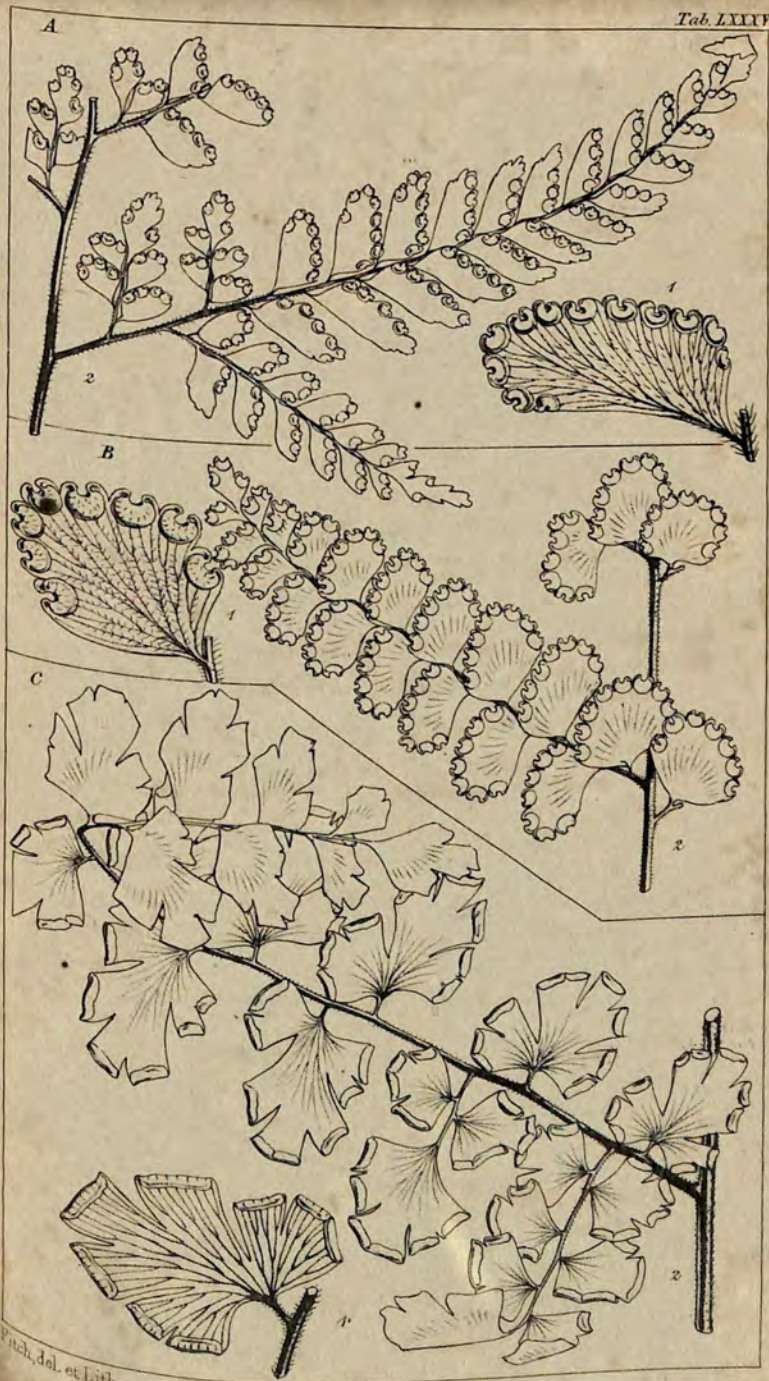
Patch. del. et lith

Tab. LXXXV.

A. Adiantum fulvum, *Raoul.*—p. 52.
Fig. 1. Fertile pinnule; *magnified.* Fig. 2. Portion of a fertile frond; *nat. size.*

B. Adiantum sessilifolium, *Hook.*—p. 44.
Fig. 1. Fertile pinnule; *magnified.* Fig. 2. Portion of a frond; *nat. size.*

C. Adiantum speciosum, *Hook.*—p. 45.
Fig. 1. Fertile pinnule; *magnified.* Fig. 2. Portion of a frond; *nat. size.*



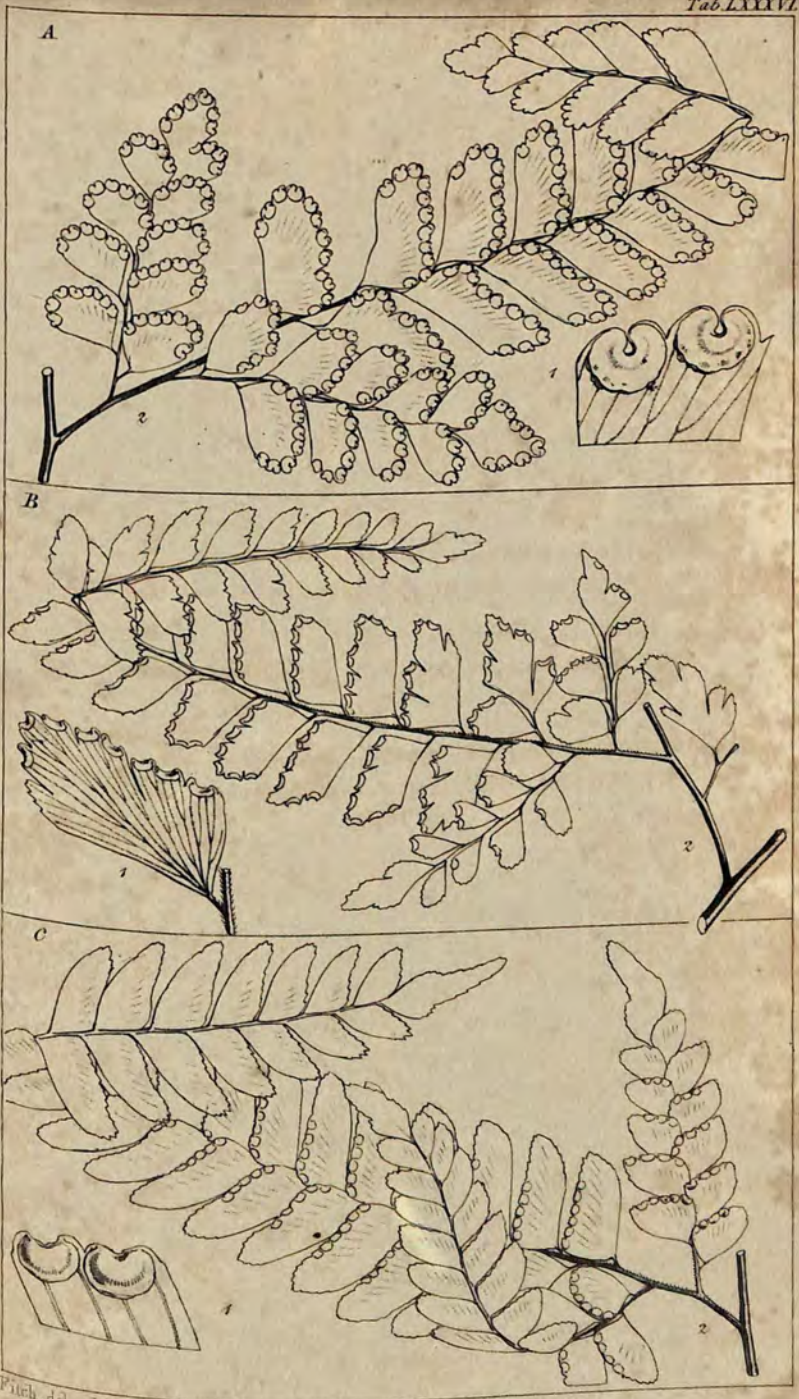
Fitch, del. et Lith.

Tab. LXXXVI.

A. Adiantum Cunninghami, *Hook.*—p. 52.
Fig. 1. Sori; *magnified.* Fig. 2. Lower pinna; *nat. size.*

B. Adiantum formosum, *Br.*—p. 51.
Fig. 1. Fertile pinnule; *magnified.* Fig. 2. Lower pinna; *nat. size.*

C. Adiantum Lobbianum, *Hook.*—p. 51.
Fig. 1. Sori; *magnified.* Fig. 2. Compound pinna; *nat. size.*



Fitch, del. et Lith.

Tab. LXXXVII.

A. Adiantum patens; *Willd.*—p. 29.

Fig. 1. Soni; *magnified.* Fig. 2. Portion of a frond; *nat. size.*

B. Lonchitis Madagascariensis, *Hook.*—p. 58.

Upper portion of a fertile frond; *nat. size.* Fig. 1. Portion of a pinna; *magnified.* Fig. 2. fertile pinna; *nat. size.* Fig. 3. Capsules with jointed filaments.

C. Cheilanthes tenuifolia, *Sw.*

Fig. 1. Pinnule; *magnified.* Fig. 2. Portion of a frond; *nat. size.*

Fitch del. et Lith.

Tab. LXXXVIII.

A. Hypolepis Californica, *Hook.*

Fig. 1. Fertile segment of a frond; *magnified.* Fig. 2. Entire plant; *nat. size.*

B. Hypolepis spectabilis, *Pr.*

Fig. 1. Fertile pinnæ; *nat. size.* Fig. 2. Compound pinna; *nat. size.*

C. Hypolepis pauperoula, *Hook.*

Fig. 1. Fertile pinnule; *magnified.* Fig. 2. Entire plant; *nat. size.*

Fitch del. et Lith.

Tab. LXXXIX.

A. Lonchitis Lindeniana, *Hook.*—p. 56.
Fig. 1. Fertile pinna; *nat. size.* Fig. 2. Portion of a pinna with sori; *magnified.*

B. Lonchitis Natalensis, *Hook.*—p. 57.
Fertile pinnule; *nat. size.*

C. Hypolepis tenuifolia, *Bernh.*—p. 60.
Fig. 1. Fertile pinna; *nat. size.* Fig. 2. Pinnule, with sori; *magnified.*

Fitch del. et lith.

Pamplin imp.

Tab. XC.

A. Hypolepis tenuifolia, var. γ., *Hook.*—p. 60.

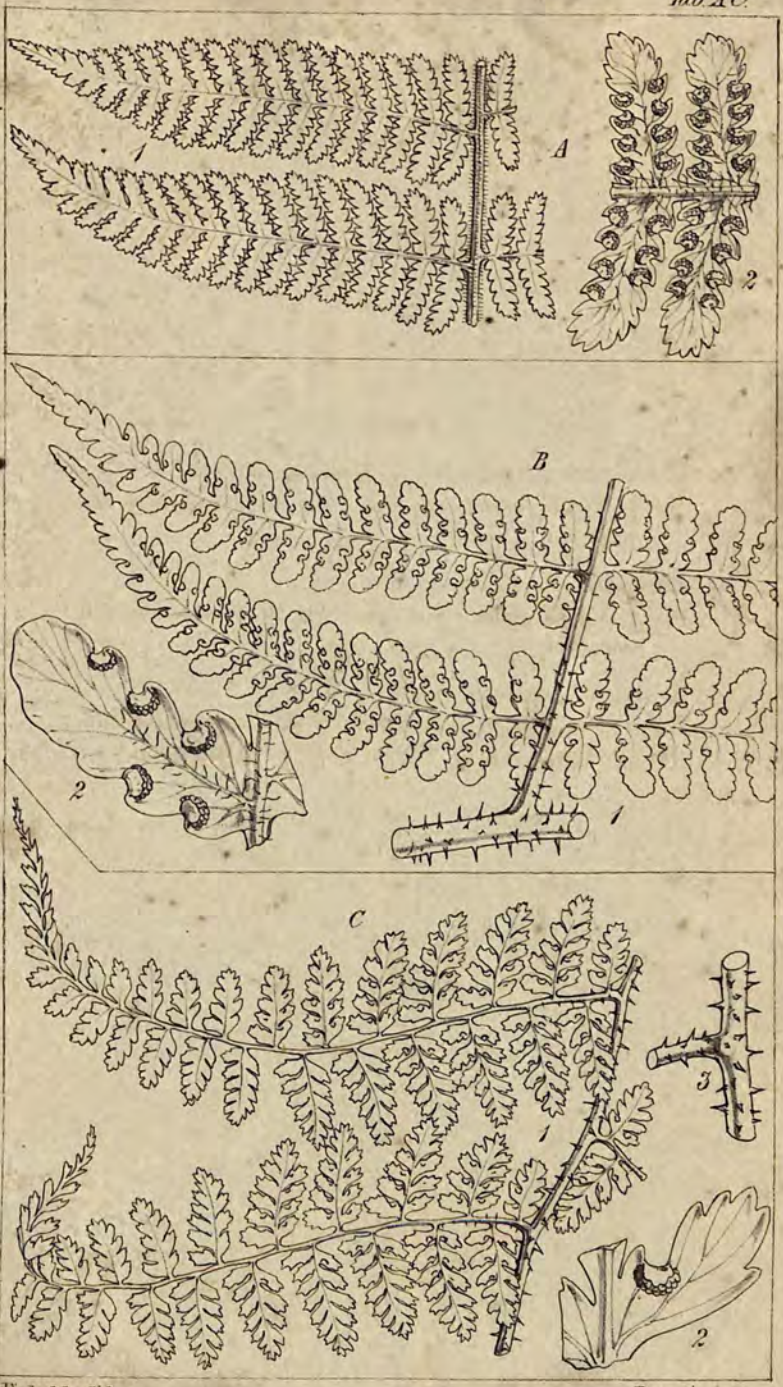
Fig. 1. Fertile pinnæ; *nat. size.* Fig. 1. Pinnules with sori; *magnified.*

B. Hypolepis repens, *Pr.*

Fig. 1. Fertile pinnæ; *nat. size.* Fig. 2. Pinnule with sori; *magnified.*

C. Hypolepis nigrescens, *Hook.*

Fig. 1. Fertile pinnæ; *nat. size.* Fig. 2. Pinnule with a sorus; *magnified.* Fig. 3. Portion of stipes and rachis; *nat. size.*


A
1
2
B
1
2
C
1
2
3

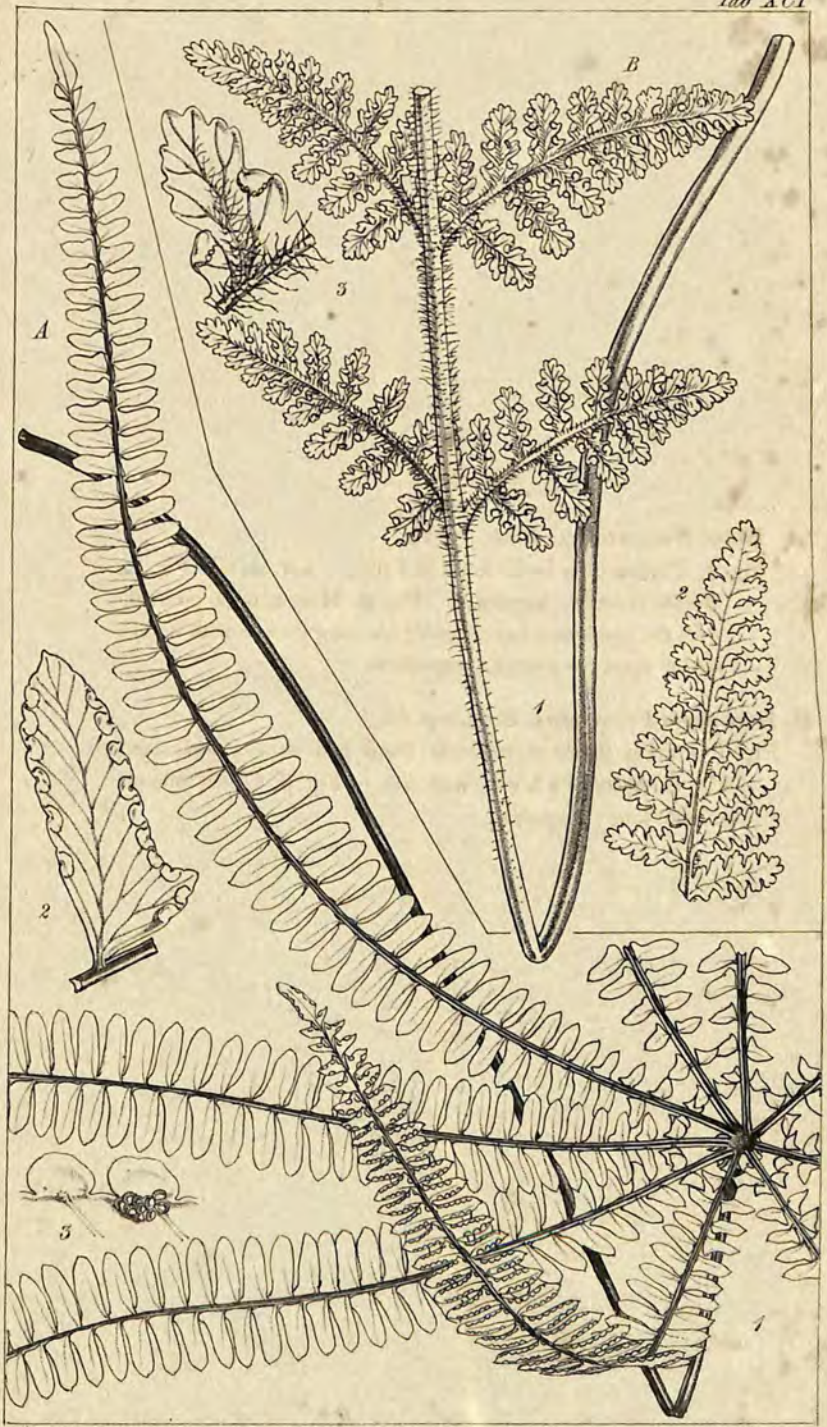
Tab. XCI.

A. Hypolepis radiata, *Hook.*—p. 72.

Fig. 1. Portion of a fertile frond and stipes; *nat. size.* Fig. 2. Fertile pinnule; *magnified.* Fig. 3. Margin of a pinnule, with the involucres forced back; showing a sorus with its insertion upon the nerves; *magnified.*

B. Hypolepis Purdieana, *Hook.*—p. 69.

Fig. 1. Portion (base) of a fertile frond and stipes; *nat. size.* Fig. 2. Apex of a frond; *nat. size.* Fig. 3. Under side of a fertile lobe; *magnified.*


A
B
1
2
3
1
2
3
1

Tab. XCII.

A. Hypolepis pedata, *Hook.*—p. 73.

Fig. 1. Frond and stipes (fertile); *nat. size.* Fig. 2. Under side of a fertile pinnule; *magnified.*

B. Hypolepis monticola, *Gardn.* (H. Gardneri, *Hook., supra,* p. 74).

Fig. 1. Fertile fronds; *nat. size.* Fig. 2. Under side of a fertile pinnule; *magnified.*

Fitch del et lith

Pamplin Imp.

Tab. XCIII.

A. Pteris scaberula. *A. Rich.* (Allosorus scaberulus, *Presl*).
Fig. 1. Sterile primary pinna; *nat. size.* Fig. 2. Fertile primary pinna, seen from beneath; *nat. size.* Fig. 3. Apex of a fertile frond, seen from beneath; *nat. size.* Fig. 4. Fertile pinnule, seen from beneath; *magnified.*

B. Cheilanthes viscosa, *Link.*—p. 104.
Fig. 1. Frond and stipes, (fertile); *nat. size.* Fig. 2. Fertile pinnule, seen from beneath; *magnified.*

A
4
3
2
1
B
1
2

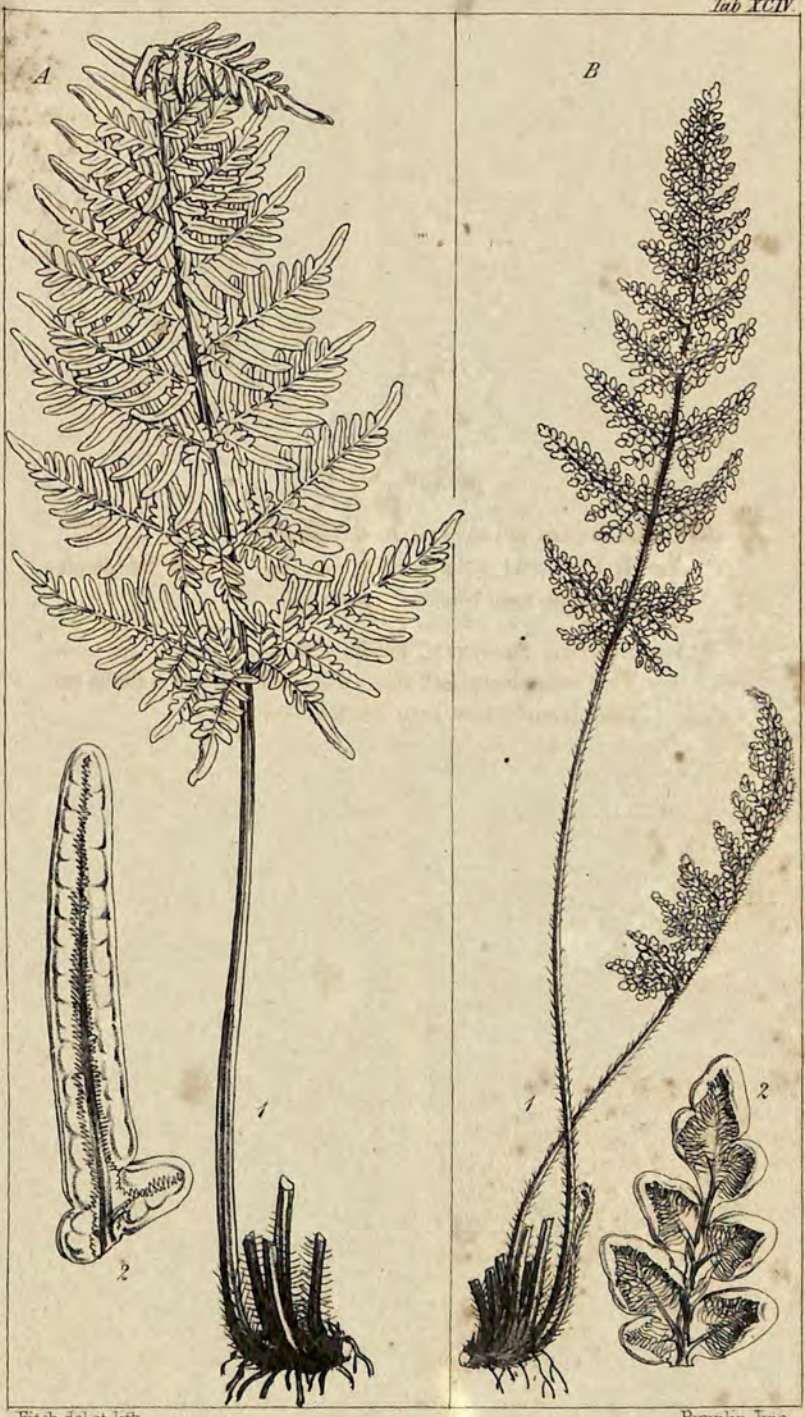
Tab. XCIV

A. Cheilanthes pulchella, *Bory*.—p. 109.

Fig. 1. Frond and stipes (fertile); *nat. size.* Fig. 2. Fertile pinnule, seen from beneath; *magnified.*

B. Cheilanthes Szovitzii, *Fisch. et Mey.*—p. 98.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Portion of a fertile primary pinnule, seen from beneath; *magnified.*



Fitch del et lith

Pamplin Imp

Tab. XCV

A. Hypolepis anthriscifolia, *Pr.*—p. 66.

Fig. 1. Portion of a fertile frond; *nat. size.* Fig. 2. Fertile pinnule or ultimate segment, seen from beneath; *magnified.*

B. Hypolepis Millefolium, *Hook.*—p. 68.

Fig. 1. Caudex and lower portion of stipes; and Fig. 2. Portion of a fertile frond; *nat. size.* Fig. 3. Fertile pinnule or ultimate segment, seen from beneath; *magnified.*

C. Hypolepis distans, *Colenso.*—p. 70.

Fig. 1. Caudex and stipes; and Fig. 2. Portion of a fertile frond; *nat. size.* Fig. 3. Fertile pinnule, or ultimate segment of a frond, seen from beneath; *magnified.*

Fitch, del et lith

Pumplin Imp

Tab. XCVI.

A. Cheilanthes bullosa, *Kunze.*—p. 88.

Fig. 1. Frond and stipes (fertile); *nat. size.* Fig. 2. Upper side of a fertile segment; *magnified.* Fig. 3. Under side of a fertile segment; *magnified.*

B. Cheilanthes Tweediana, *Hook.*—p 84.

Figs. 1 and 2. Fronds (fertile) and stipites; *nat. size.* Fig. 3. Under side of a fertile pinnule; *magnified.*

Fitch del et lith.

Pamplin Imp

Tab. XCVII.

A. Cheilanthes Seemanni, *Hook.*—p. 85.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Ultimate pinnule (fertile); *nat. size.*

B. Cheilanthes Sieberi, *Kunze.*—p. 83.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Pinnule (fertile), seen from beneath; *magnified.*

Fitch del et lith

Pamplin Imp

Tab. XCVIII.

A. Cheilanthes microphylla, *Sw.*—p. 84.; (reference to the figure there inadvertently omitted).

Fig. 1. Plant (fertile); *nat. size.* Fig. 2. Fertile pinnule, seen from beneath; *magnified.*

B. Cheilanthes subvillosa, *Hook.*—p. 87.

Figs. 1. and 2. Upper and under side of a fertile frond; *nat. size.* Fig. 3. Fertile segment, seen from beneath; *magnified.*

Fitch del et lith.

Pamplin Imp.

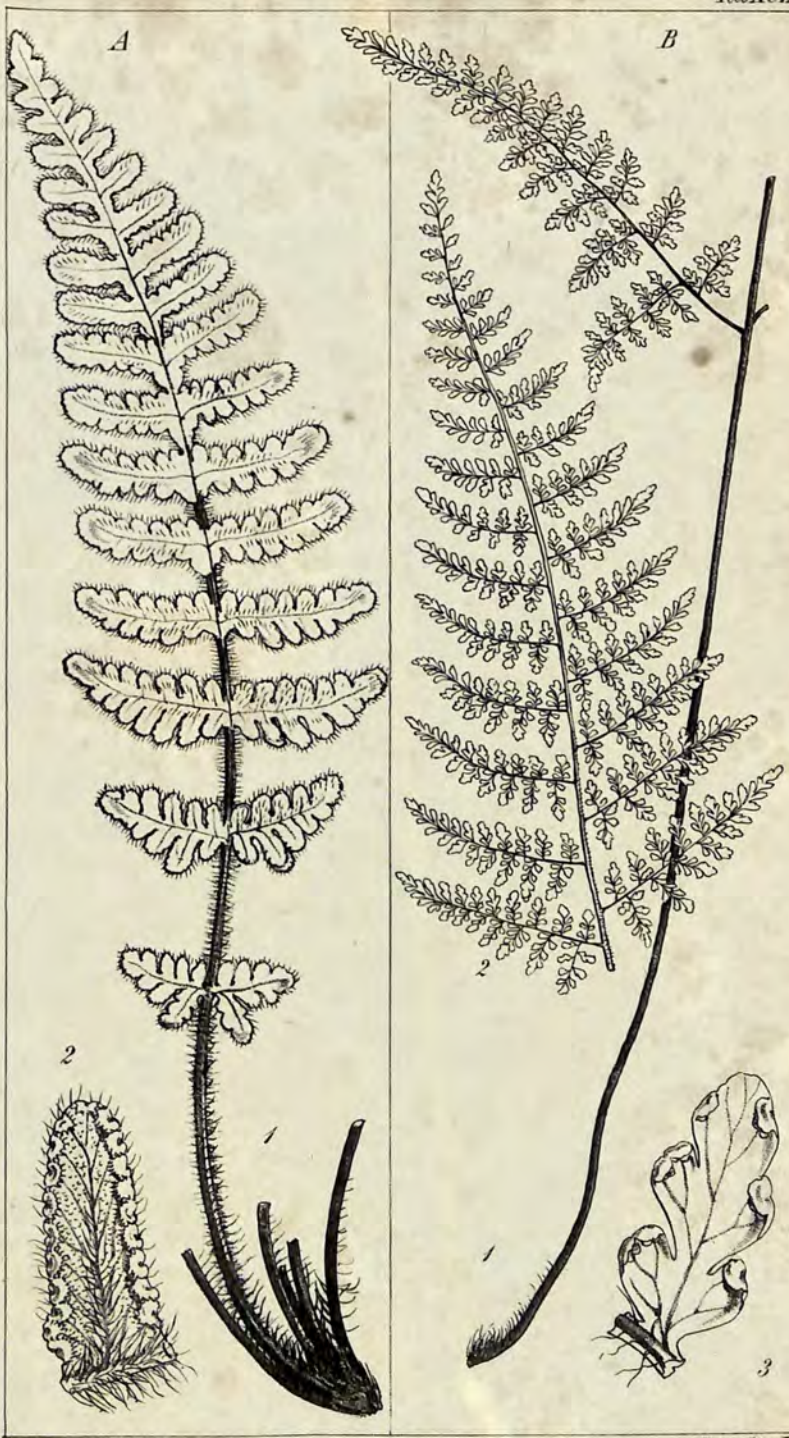
Tab. XCIX.

A. Cheilanthes rufa, *Don.*—p. 79.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile segment, seen from beneath; *magnified.*

B. Cheilanthes Moritziana, *Kunze.*—p. 85.

Figs. 1. and 2. Portions of a fertile frond; *nat. size.* Fig. 3. Pinnule (fertile), seen from beneath; *magnified.*



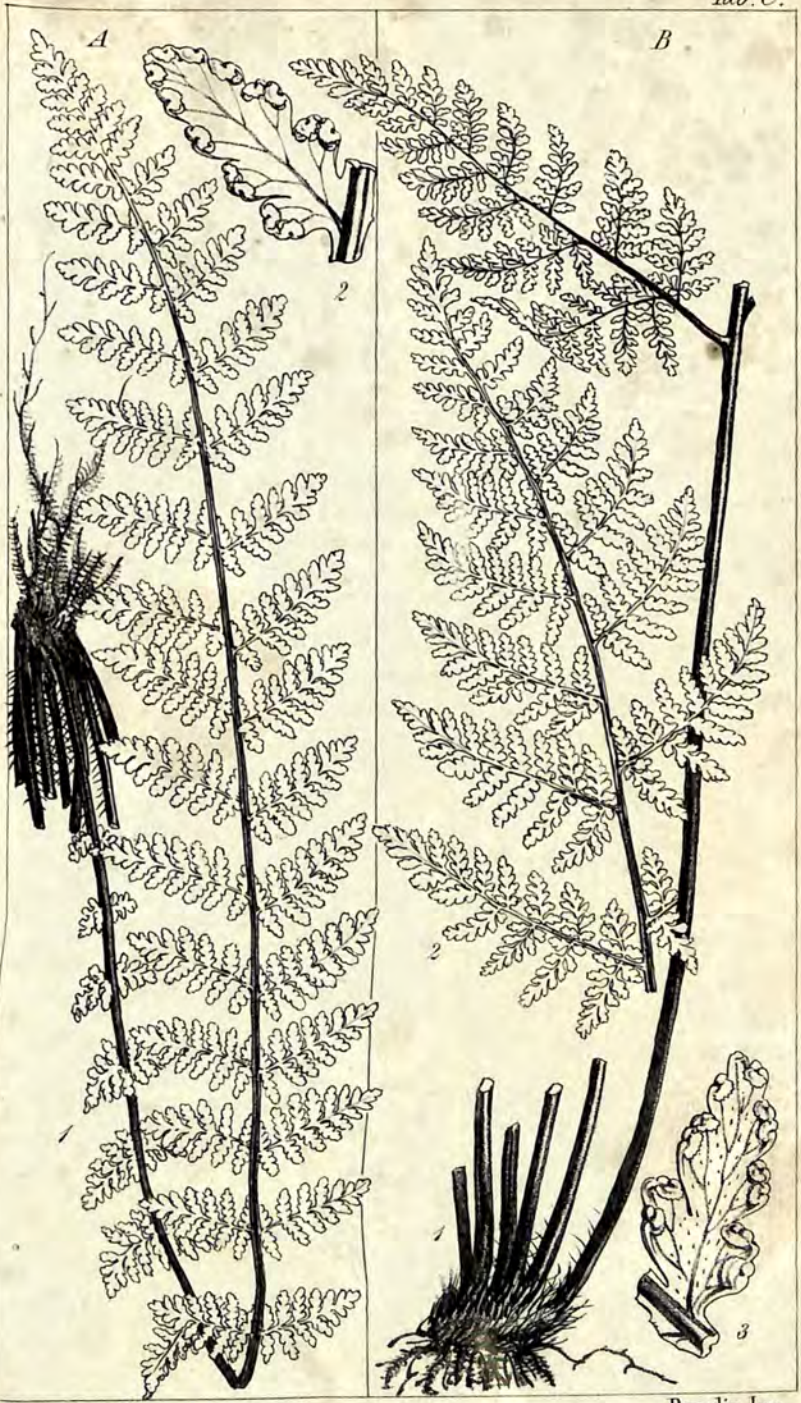
Fitch del et lith.

Pamplin Imp

Tab. C.

A. Cheilanthes Mysurensis, *Wall.*—p. 94.
Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile pinnule, seen from beneath; *magnified.*

B. Cheilanthes multifida, *Sw.*—p. 90.
Figs. 1 and 2. Portions of a fertile frond; *nat. size.* Fig. 3. Fertile pinnule, seen from beneath; *magnified.*



Fitch del et lith

Pamplin Imp.

Tab. CI.

A. Cheilanthes pteroides, *Sw.*—p. 80.

Figs. 1 and 2. Portions of a fertile frond; *nat. size.* Fig. 3. Portion of a fertile pinnule, seen from beneath; *magnified.*

B. Cheilanthes hirta, *Sw.*—p. 92.

Figs. 1 and 2. Portions of a fertile frond; *nat. size.* Fig. 3. Fertile pinnule, seen from beneath; *magnified.* Fig. 4. Portion of a frond of var. *β.*; *nat. size.*

Fitch del et lith.

Pamplin imp

Tab. CII.

A. Cheilanthes induta, *Kunze.*—p. 92.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile pinnule, seen from beneath; *magnified.*

B. Cheilanthes dichotoma, *Sw.*—p. 104.

Figs. 1 and 2. Portions of a fertile frond; *nat. size.* Fig. 3. Ultimate fertile pinna, seen from beneath; *magnified.*

Fitch del et lith.

Pamplin imp.

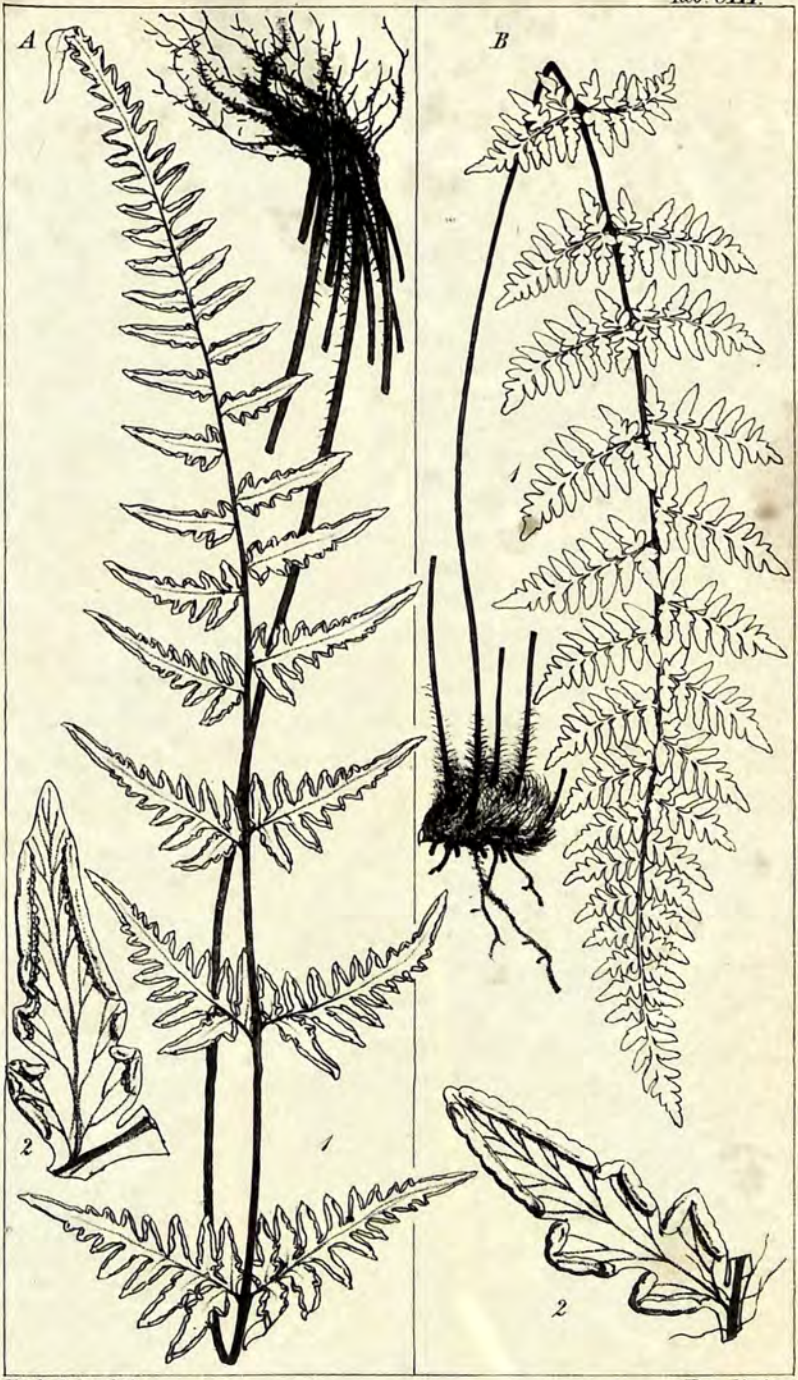
Tab. CIII.

A. Cheilanthes varians, *Hook.*—p. 89.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile pinnule, seen from beneath; *magnified.*

B. Cheilanthes Alabamensis, *Kunze.*—p. 89.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile pinnule, seen from beneath; *magnified.*



Fitch del et lith.

Pamplin imp.

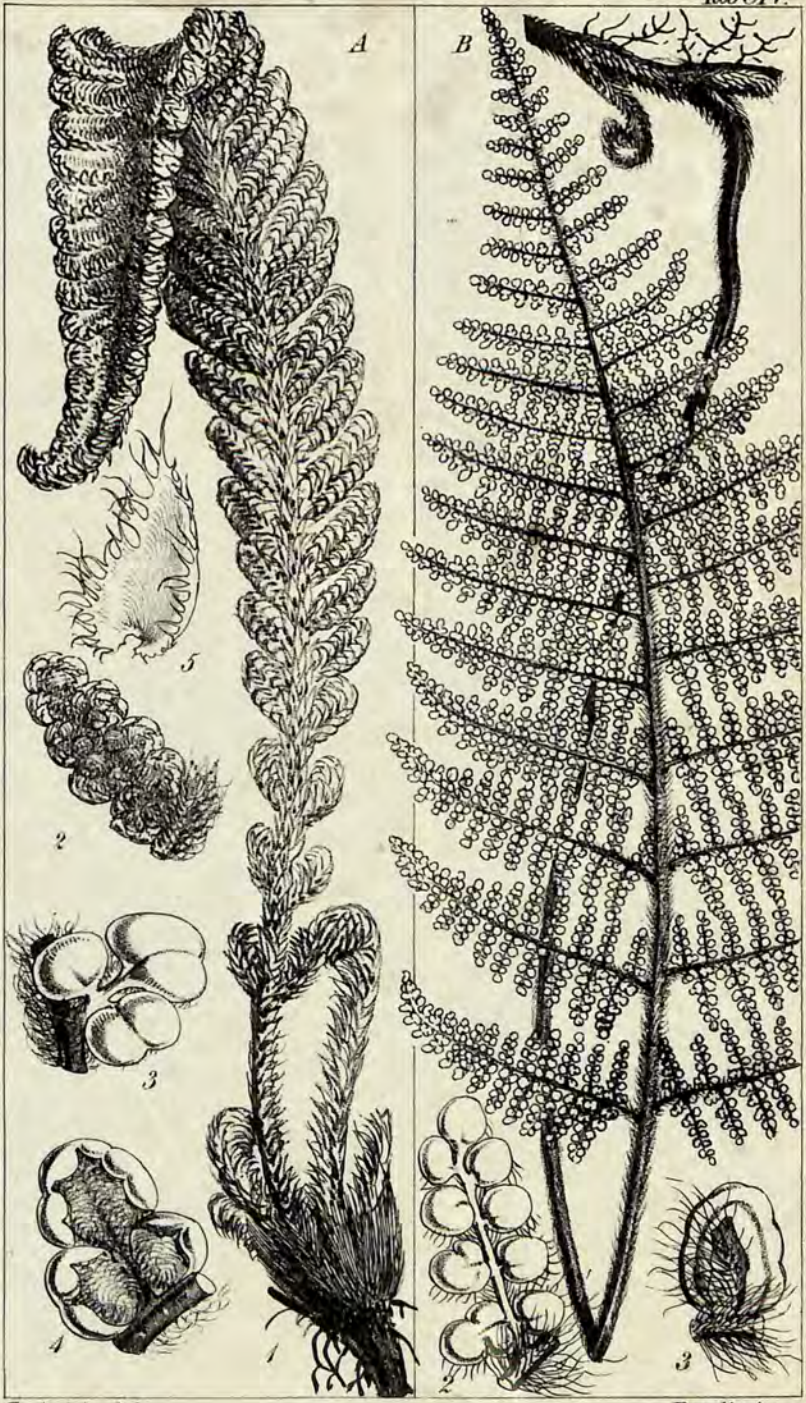
Tab. CIV.

A. Cheilanthes scariosa, *Presl.*—p. 99.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile pinna, seen from beneath; *magnified.* Fig. 3. Ultimate fertile pinna (of three pinnules), seen from above; and Fig. 4, the same seen from beneath; *more magnified.* Fig. 5. Scale from the rachis; *highly magnified.*

B. Cheilanthes lendigera, *Sw.*—p. 95.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Secondary pinna (fertile), seen from above; *magnified.* Fig. 3. Fertile pinnule, seen from beneath; *more magnified.*



Fitch del et lith.

Pamplin imp.

Tab. CV.

A. Cheilanthes myriophylla, *Desv.*—p. 100.

Fig. 1. Fertile frond; *nat. size.* Fig. 2. Secondary pinna (fertile), seen from above; *magnified.* Fig. 3. Fertile pinnule, seen from beneath; *more magnified.* Fig. 4. Scale from the rachis; *magnified.*

B. Cheilanthes elegans, *Desv.*—p. 102.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Secondary pinna (fertile), seen from above; *magnified.* Fig. 3. Fertile pinnule, seen from beneath; *magnified.*

Fitch del et lith.

Pamplin imp.

Tab. CVI.

A. Cheilanthes lendigera, *Sw.* β.—p. 96.

Figs. 1 and 2. Portions of a fertile frond; *nat. size.* Fig. 3. Secondary pinna, seen from beneath; *magnified.* Fig. 3.* Chaffy hairs from the rachis; *magnified.*

B. Cheilanthes Chusana, *Hook.*—p. 95.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile segment, seen from beneath; *magnified.*

Fitch del et lith

Pamplin imp.

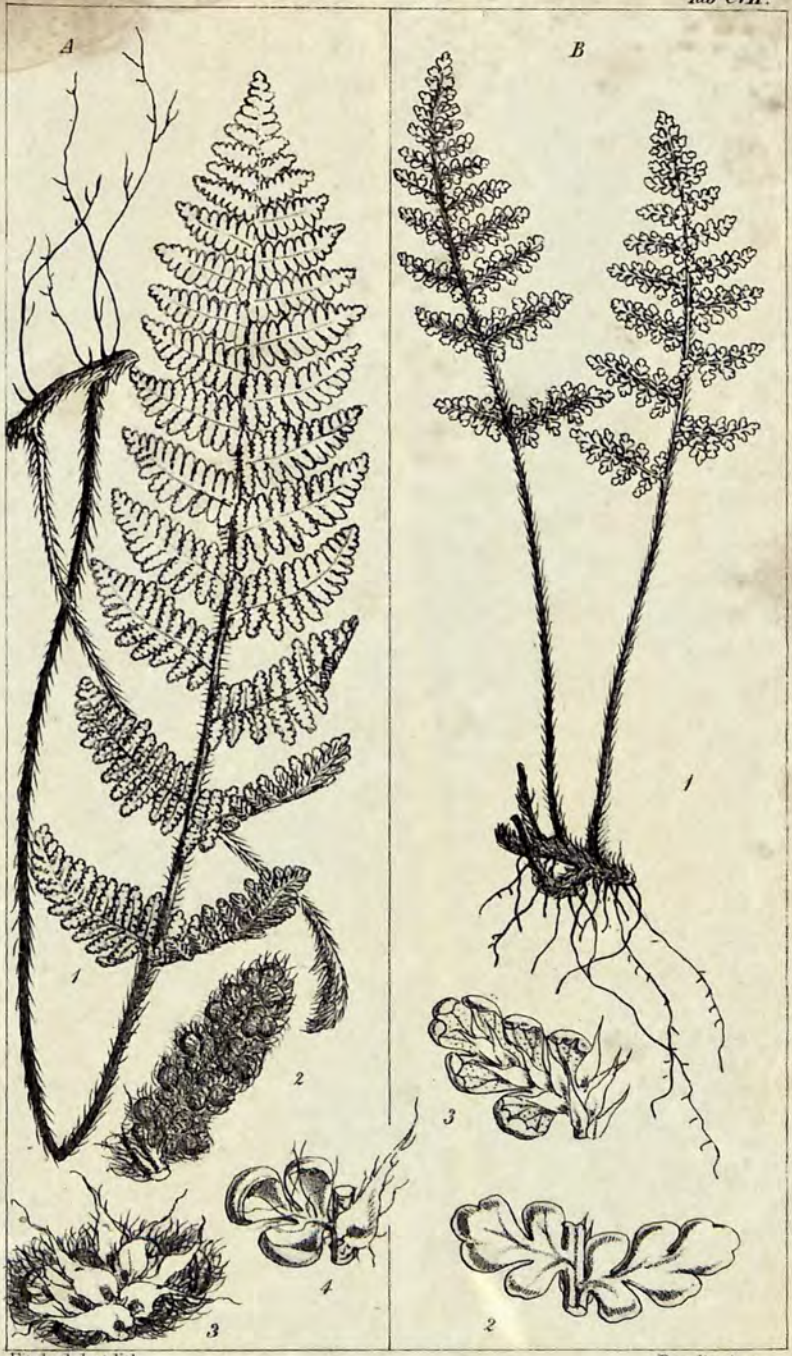
Tab. CVII.

A. Cheilanthes Lindheimeri, *Hook.*—p. 101.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Secondary fertile pinna, seen from above; *magnified.* Fig, 3. Portion of a fertile secondary pinna, seen from beneath; *magnified.* Fig. 4. Ultimate pinna (fertile) of three lobes, or pinnules, seen from beneath; *magnified.*

B. Cheilanthes Fendleri, *Hook.*—p. 103.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile secondary pinnules, seen from above: Fig. 3. A fertile secondary pinna, seen from beneath; *magnified.*



Fitch del et lith

Pamplin imp.

Tab. CVIII.

A. Cheilanthes aspera, *Hook.*—p. 111.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile pinnule, seen from above; *magnified.* Fig. 3. Fertile pinnule, seen from beneath; *magnified.* Fig. 4. Hairs from the upper surface of the frond; *much magnified.*

B. Cheilanthes vestita, *Sw.*—p. 98.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Tertiary pinnæ (fertile) seen from above: and Fig. 3. One of the same seen from beneath; *magnified.* Fig. 4. Fertile pinnules, seen from beneath, freed from the tomentum; *magnified.*

Fitch del et lith.

Pamplin imp.

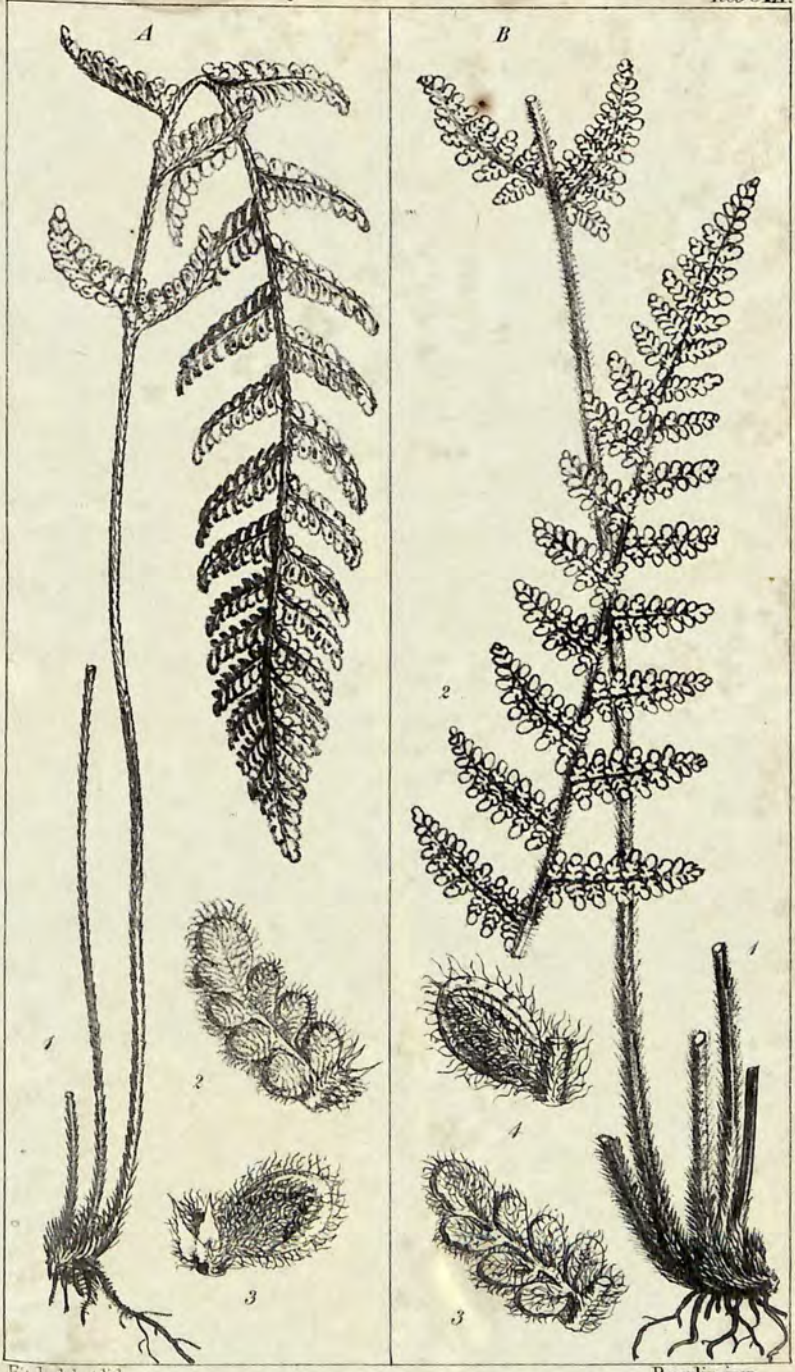
Tab. CIX.

A. Cheilanthes tomentosa, *Link.*—p. 96.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile secondary pinna seen from above; *magnified.* Fig. 3. Fertile pinnule, seen from beneath; *magnified.*

B. Cheilanthes Braddurii, *Hook.*—p. 97.

Figs. 1 and 2. Portions of a fertile frond; *nat. size.* Fig. 3. Secondary fertile pinna, seen from above; *magnified.* Fig. 4. Fertile pinnule, seen from beneath; *magnified.*



Fitch del et lith.

Pamplin imp.

Tab. CX.

A. Cheilanthes Wrightii, *Hook.*,—p. 87.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile pinnule, seen from beneath; *magnified.*

B. Cheilanthes MacLeanii, *Hook.*—p. 93.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile pinnule, seen from beneath; *magnified.* Fig. 4. Glandular hairs from the rachis; *highly magnified.*

Fitch del et lith.

Pamplin imp.

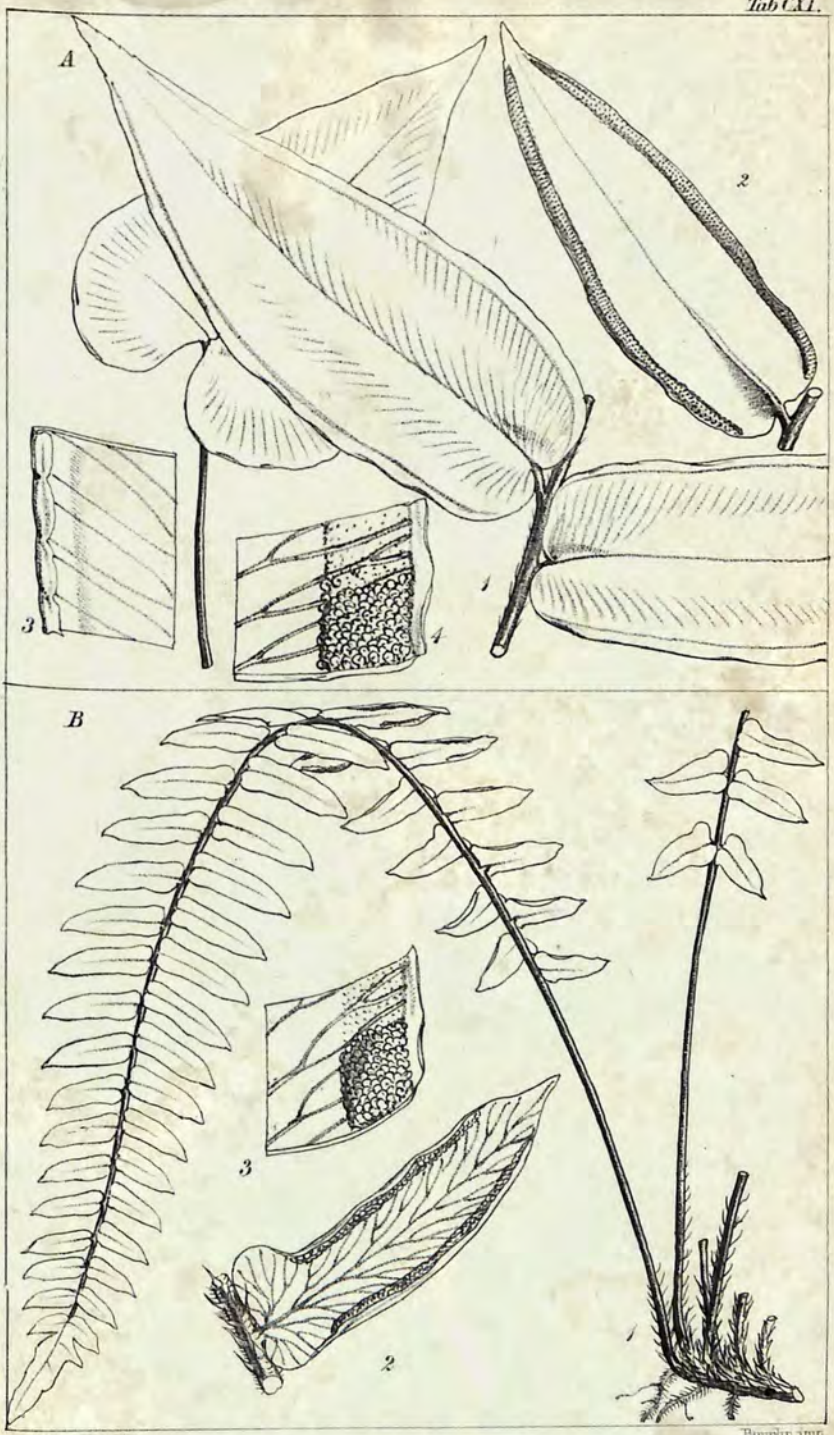
Tab. CXI.

A. Pellæa paradoxa, *Hook.*—p. 135.

A young entire (simple) and sterile frond; *nat. size.* Fig. 1. Two fertile pinnæ, upper side. Fig. 2. Fertile pinna, under side. Fig. 3. Portion of a very young fertile pinna to show the immature involucre and the veins; *magnified.* Fig. 4. Portion of a sorus, showing the receptacle of the sorus; *magnified.*

B. Pellæa falcata, γ. nana, *Hook.*—p. 136.

Fig. 1. Fertile frond of var. *nana; nat. size.* Fig. 2. Under side of a fertile pinna; and Fig. 3. Portion of a sorus; *magnified.*



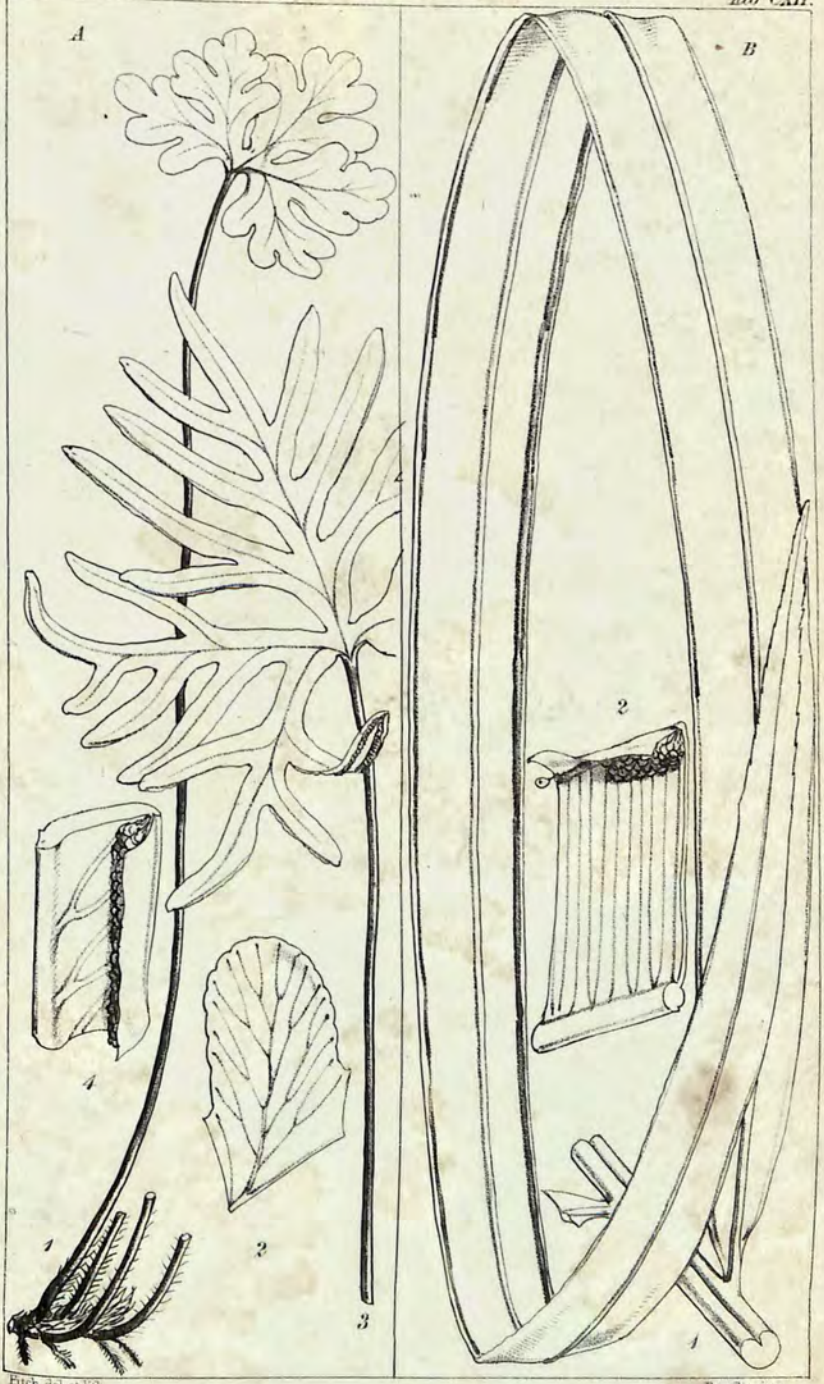
Pitch del et lith.

Bunpin imp.

Tab. CXII.

A. Pellæa lomariacea, β. columbina, *Hook.*—p. 133.
Fig. 1. Sterile frond; *nat. size.* Fig. 2. Segment of the same, showing the venation; *magnified.* Fig. 3. Fertile frond; *nat. size.* Fig. 4. Portion of a sorus; *magnified.*

B. Pteris (Eupteris) Moluccana, *Bl.*—p. 158.
Fig. 1. Portion of a rachis and a fertile pinna; *nat. size.* Fig. 2. Portion of a pinna and sorus; *magnified.*



Fitch del et lith.

Pamplin imp.

Tab. CXIII.

A. Pellæa dura, *Hook.*—p. 139.
Fig. 1. Fertile frond; *nat. size.* Fig. 2. Under side of a fertile pinna; and Fig. 3. Portion of a sorus; *magnified.*

B. Pteris (Heterophlebium) grandifolium, *L.*—p. 201.
Fig. 1. Fertile pinna; *nat. size.* Fig. 2. Portion of the same, showing the nature of the sorus and the venation; *magnified.*

Fitch del et lith.

Pimpin imp.

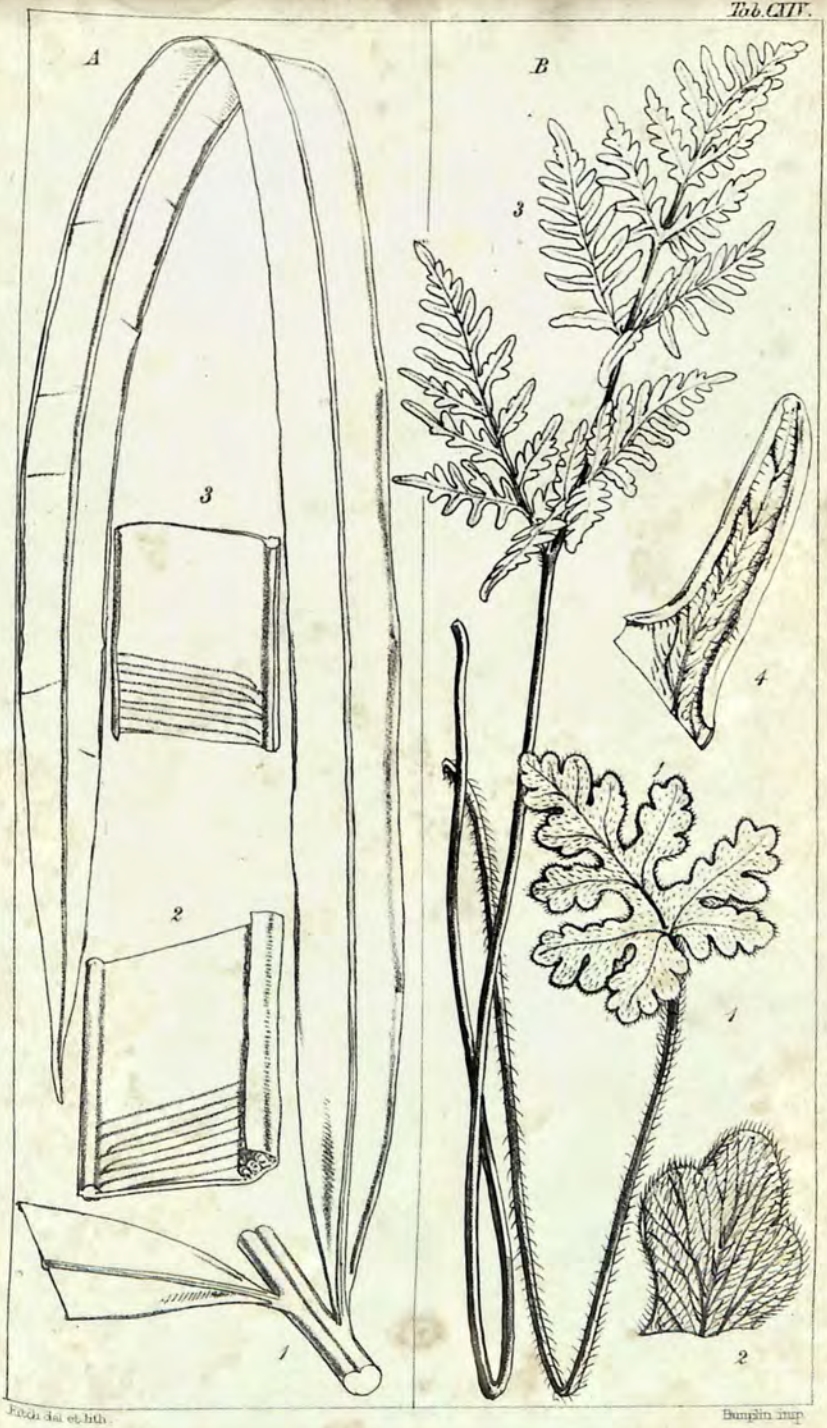
Tab. CXIV.

A. Pteris (Eupteris) opaca, *J. Sm.*—p. 158.

Fig. 1. Portion of a rachis and pinna; *nat. size.* Fig. 2. Portion of a fertile; and Fig. 3. Portion of a sterile pinna, seen from beneath, showing the venation; *magnified.*

B. Pellæa pilosa, *Hook.*—p. 132.

Fig. 1. Sterile frond; *nat. size.* Fig. 2. Portion of a segment; *magnified.* Fig. 3. Fertile frond; *nat. size.* Fig. 4. Segment, with sori, seen from beneath; *magnified.*



Fitch del. et lith.
Bumpkin imp.

Tab. CXV.

A. Pellæa longimucronata, *Hook.*—p. 143.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile pinnule, seen from above; and Fig. 3. Fertile pinnule, seen from beneath; *magnified.*

B. Pellæa Wrightiana, *Hook.*—p. 142.

Fig. 1. Fertile plant; *nat. size.* Fig. 2. Fertile pinnule, seen from above; and Fig. 3. Fertile pinnule, seen from beneath; *magnified.* Fig. 4. Primary pinna of a sterile frond; *nat. size.*

A
1
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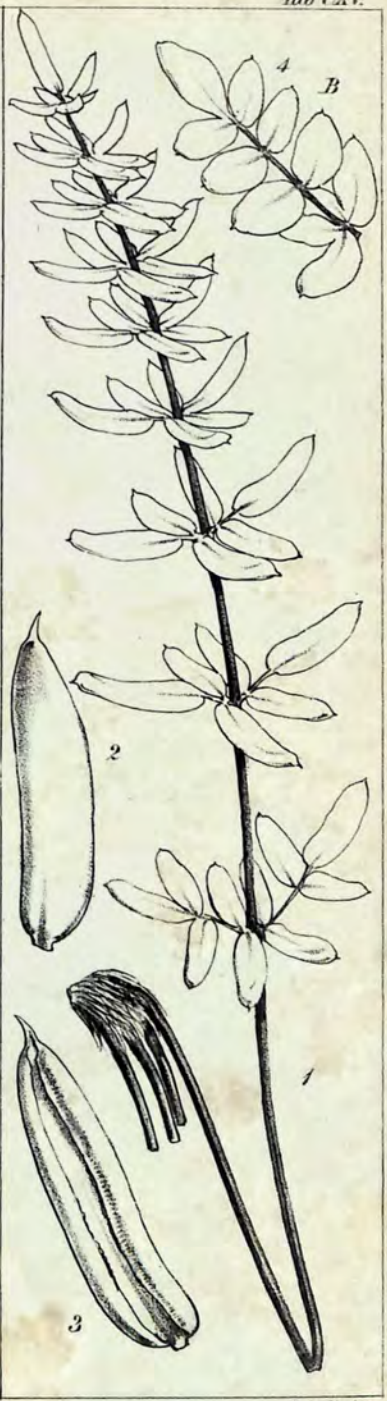
3


4
B
2
1
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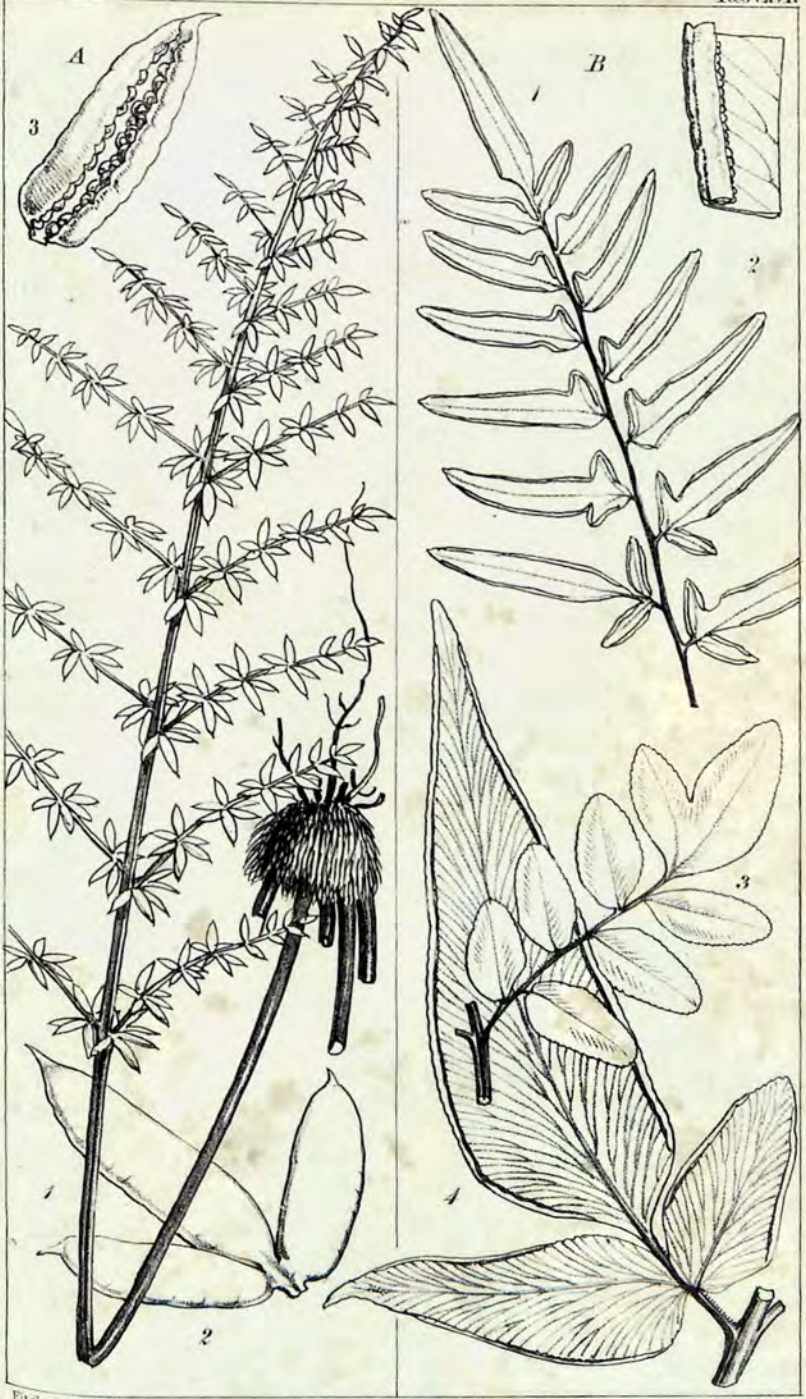
Tab. CXVI.

A. Pellæa ornithopus, *Hook.*—p. 144.

Fig. 1. Fertile frond; *nat. size.* Fig. 2. Secondary pinna, seen from above. Fig. 3. Fertile pinnule, seen from beneath; *magnified.*

B. Pellæa hastata, *Link.*—p. 145.

Fig. 1. Portion of a frond, normal form; *nat. size.* Fig. 2. Portion of pinnule, with sorus; *magnified.* Fig. 3. Sterile pinna; *nat. size.* Fig. 4. Pinna of var. *macrophylla,* Kze., with sori, seen from beneath; *nat. size.*



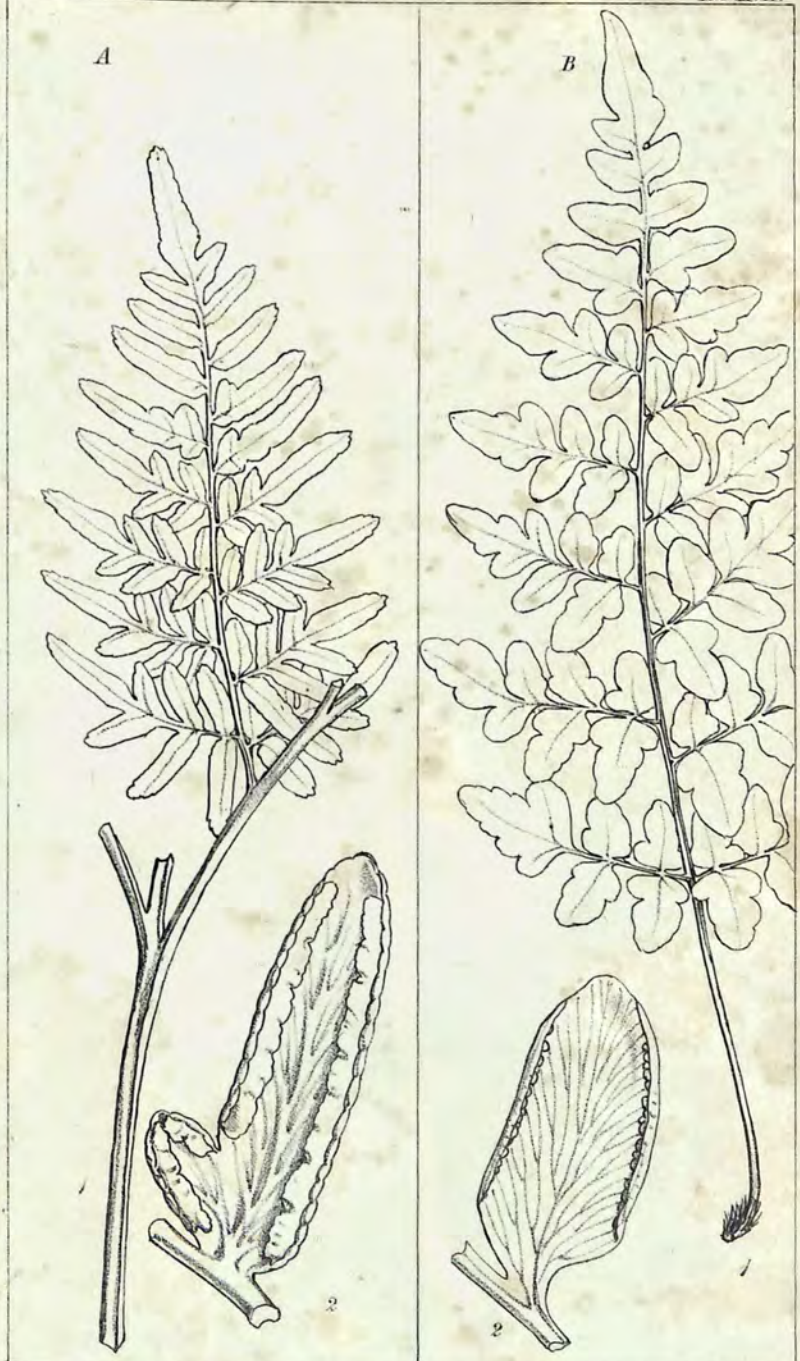
Eitch. del. et lith.

Pamphin imp.

Tab. CXVII.

A. Pellæa consobrina, *Hook.*—p. 145.
Fig. 1. Portion of a fertile frond; *nat. size.* Fig. 2. Pinnule, with seri; *magnified.*

B. Pellæa Seemanni, *Hook.*—p. 141.
Fig. 1. Fertile frond; *nat. size.* Fig. 2. Fertile pinnule, seen from beneath; *magnified.*


A
B
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2

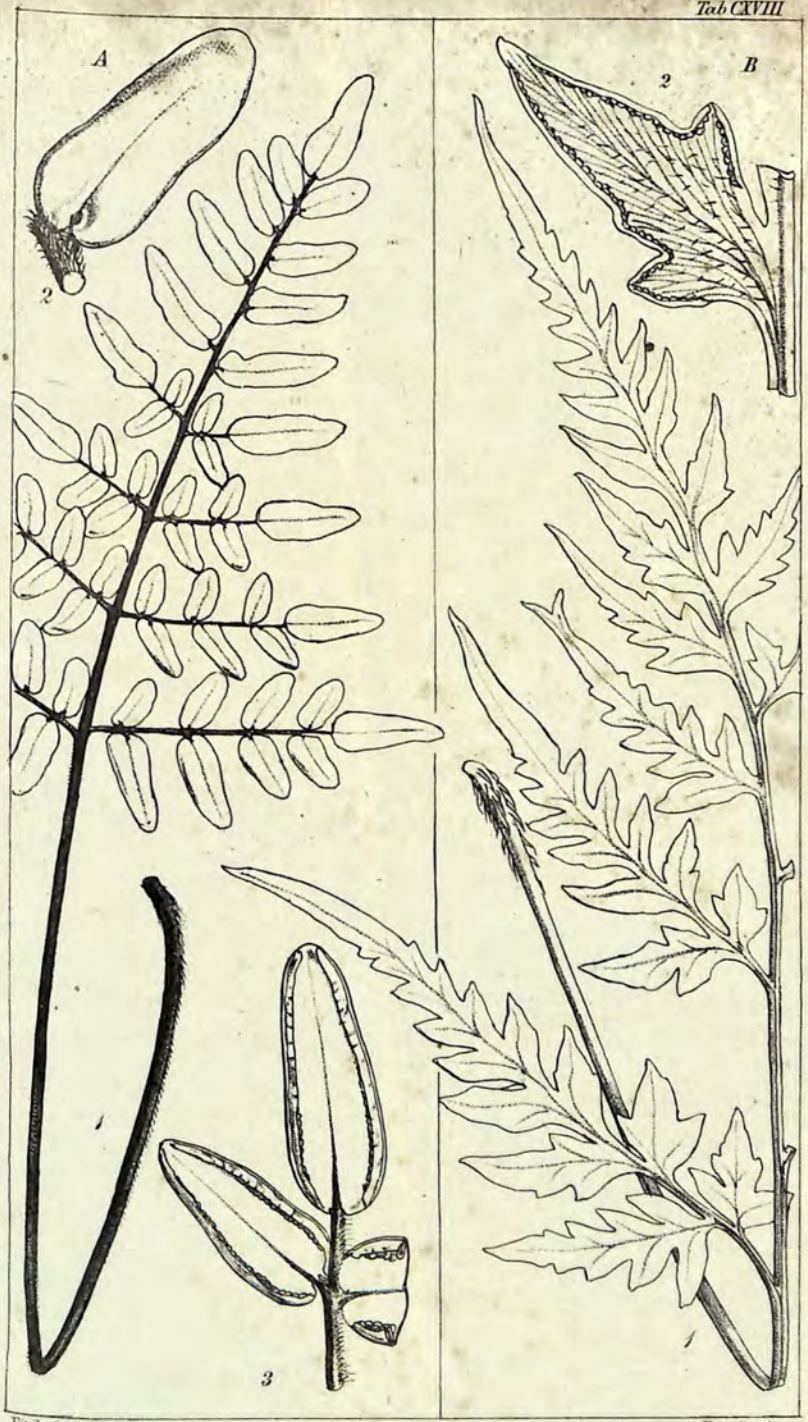
Tab. CXVIII.

A. Pellæa Boivini, *Hook.*—p. 147.

Fig. 1. Fertile frond; *nat. size.* Fig. 2. Upper side of a fertile pinnule; and Fig. 3. Under side of fertile pinnules; *magnified.*

B. Pellæa Skinneri, *Hook.*—p. 141.

Fig. 1. Fertile frond; *nat. size.* Fig. 2. Fertile segment, seen from beneath; *magnified.*



Fitch del et lith.

Pamplin imp

Tab. CXIX.

A. Pellæa Bojeri, *Hook.*—p. 146.

Fig. 1. Portion of a fertile frond; *nat. size.* Fig. 2. Under side of a fertile pinnule; *magnified.*

B. Pellæa decomposita, *Hook.*—p. 150.

Fig. 1. Portion of a fertile frond; *nat. size.* Fig. 2. Fertile pinna, seen from beneath; *magnified.*

Fitch del et lith.

Pamplin imp.

Tab. CXX.

A. Pteris (Eupteris) Chilensis, *Desv.*—p. 175.

Fig. 1. Small portion of a fertile frond; *nat. size.* Fig. 2. Segments of a pinna, with sori, seen from beneath; and Fig. 3. Portion of sorus; *magnified.*

B. Pteris (Eupteris) tremula, *Br.*—p. 174.

Fig. 1. Small portion of a fertile frond; *nat. size.* Fig. 2. Portion of a segment, with sori, seen from beneath; *magnified.*

A
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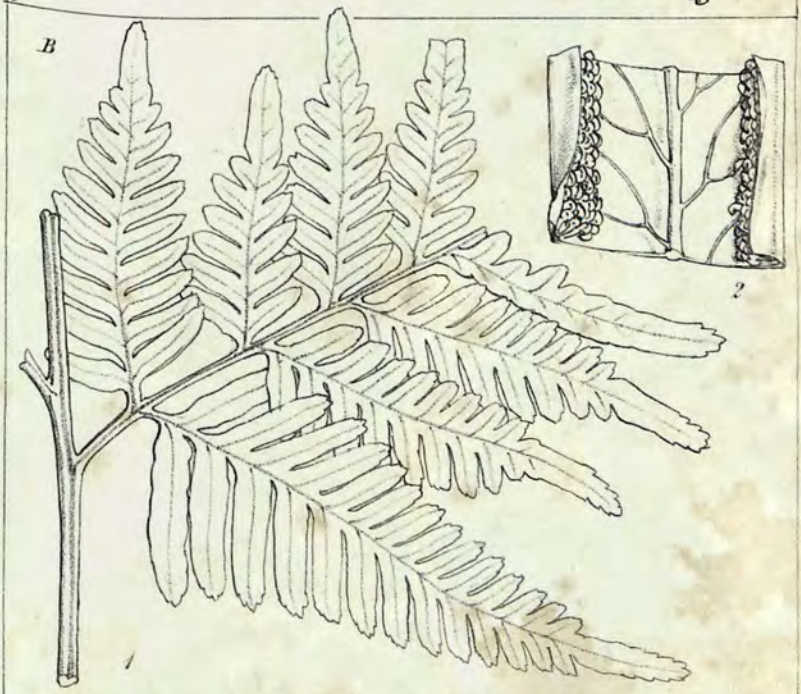

B
2
1

Tab. CXXI.

A. Pteris (Eupteris) Dalhousiæ, *Hook.*—p. 170.

Fig. 1. Lowest pinna; and Fig. 2. Extremity of a fertile frond; *nat. size.* Fig. 3. Portion of a segment, with sori; *magnified.*

B. Pteris (Ornithopteris) scalaris, *Moritz.*—p. 200.

Fig. 1. Caudex and stipes; and Fig. 2. Portion of the fertile frond; *nat. size.* Fig. 3. Sterile lobe or pinnule; and Fig. 4. Fertile pinna, seen from beneath; *magnified.*—[See also Tab. CXLI. C. of Vol. III., for the analysis of the sorus.]

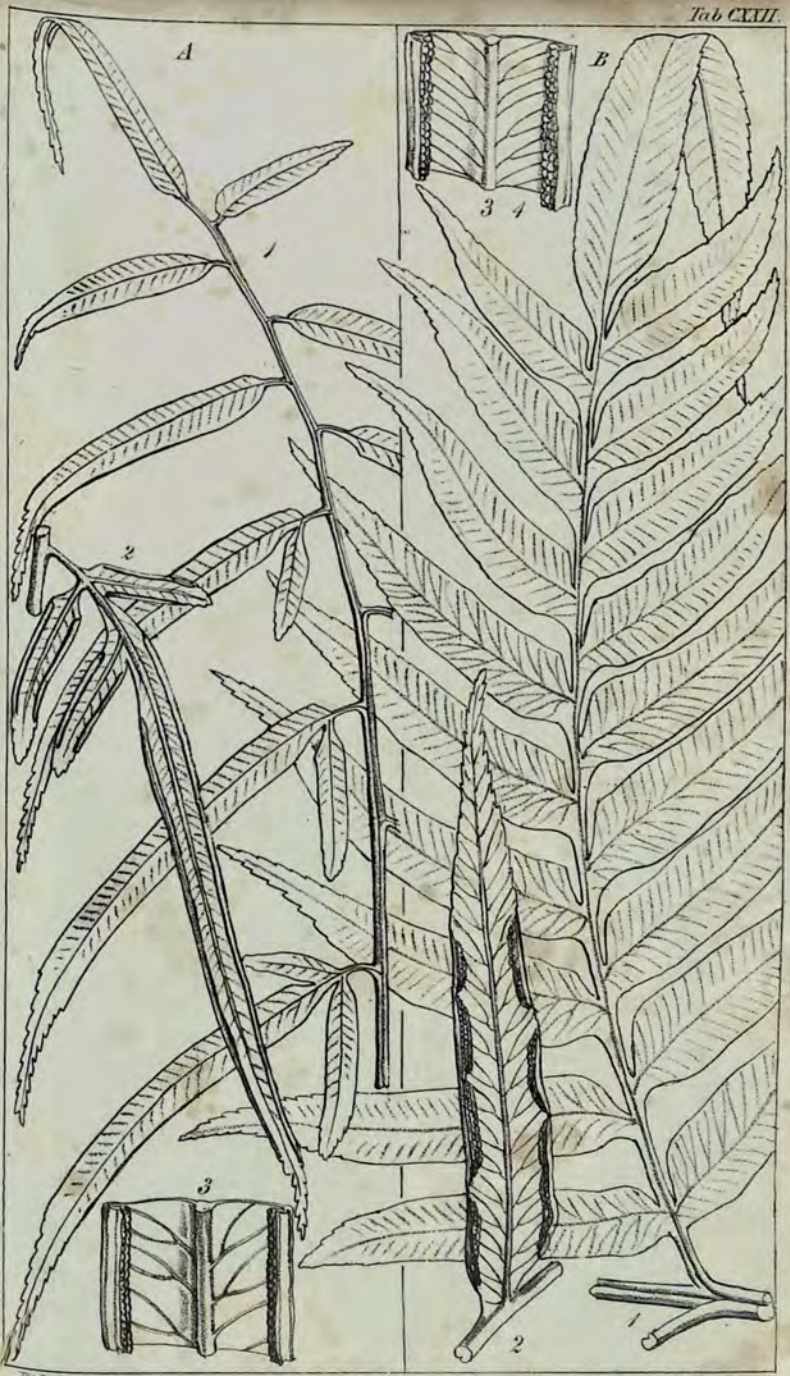
Fitch del et lith

Pamplin imp.

Tab. CXXII.

A. Pteris (Eupteris) Madagascarica, *Ag.*—p. 171.
Fig. 1 and 2. Extremity and lower pinna of a fertile frond; *nat. size.* Fig. 3. Portion of a fertile pinnule, seen from beneath; *magnified.*

B. Pteris (Eupteris) marattiæfolia, *Hook.*—p. 177.
Fig. 1. Primary pinna of a fertile frond; *nat. size.* Fig. 2. Fertile pinnule, seen from beneath; and Fig. 3. Portions of sori; *magnified.*



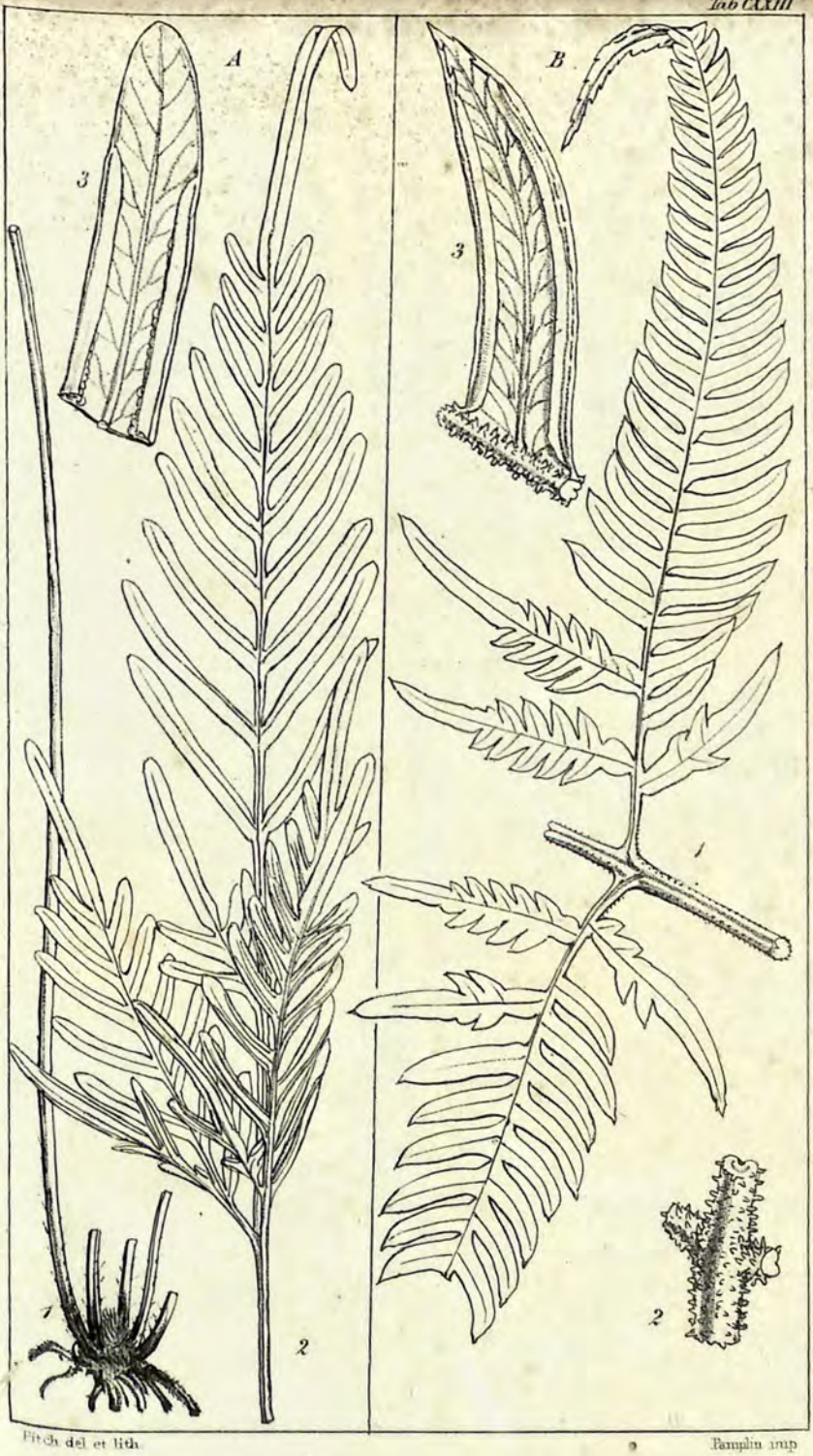
Pitch del et lith.

Pamplin imp

Tab. CXXIII.

A. Pteris (Eupteris) Griffithiana, *Hook.*—p. 170.
Fig. 1 and 2. Fertile frond; *nat. size.* Fig. 3. Portion of a segment, with sori; *magnified.*

B. Pteris (Eupteris) muricata, *Hook.*—p. 193.
Fig. 1. Portion of a frond; *nat. size.* Fig. 2. Portion of a rachis; and Fig. 3. Fertile segment; *magnified.*



Fitch del et lith

Pamplin imp

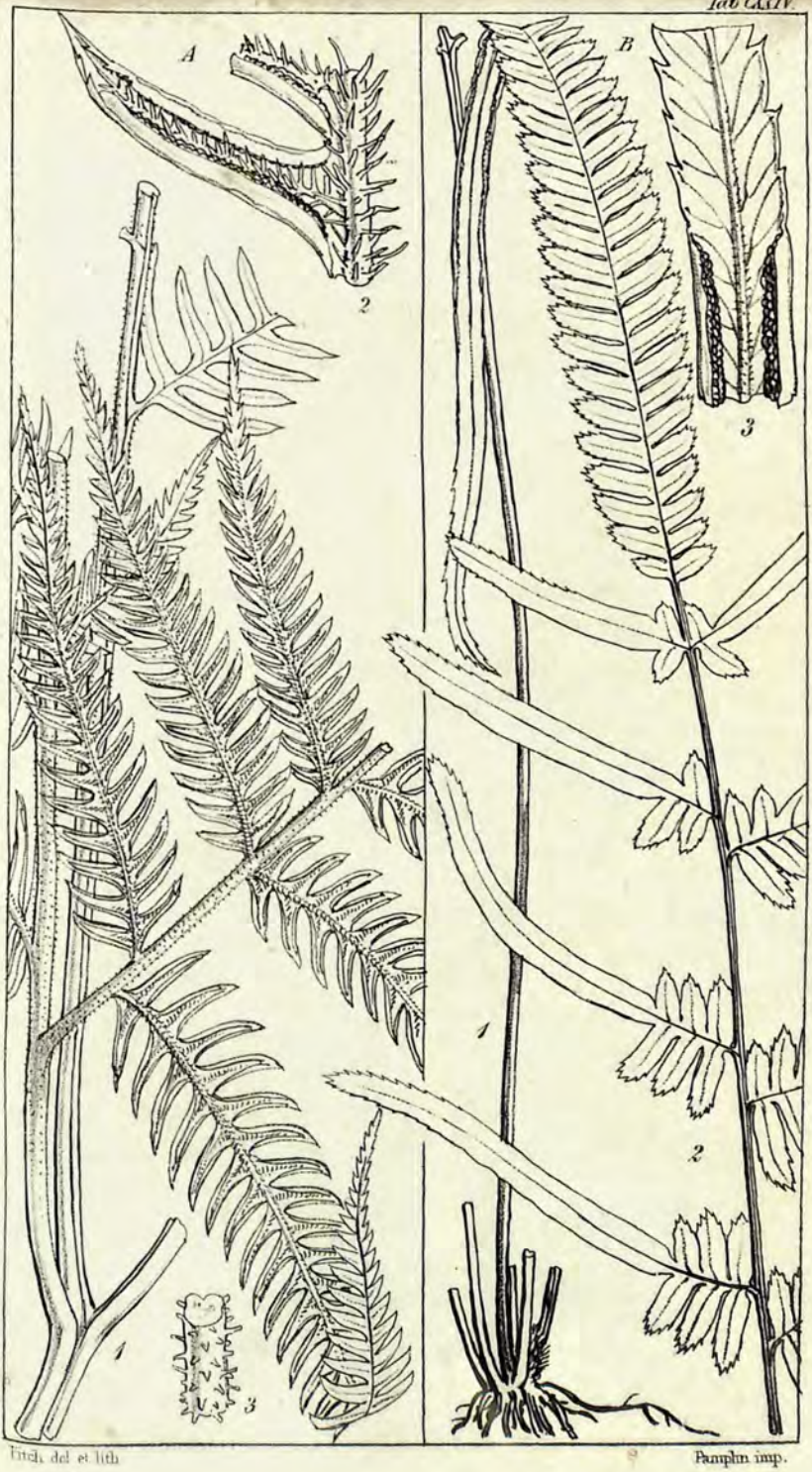
Tab. CXXIV.

A. Pteris (Eupteris) coriacea, *Desv.*—p. 192.

Fig. 1. Portion of the tripartite fertile frond; *nat. size.* Fig. 2. Fertile portion of a pinnule, with its spinulose costa, seen from beneath; and Fig. 3. Portion of the muricated rachis; *magnified.*

B. Pteris (Eupteris) distans, *J. Sm.*—p. 169.

Fig. 1. and 2. Fertile frond; *nat. size.* Fig. 3. Portion of a fertile pinna; *magnified.*



Finch. del. et lith.

Pamplin imp.

Tab. CXXV.

A. Pellæa Doniana, *Hook.*—p. 137.

Fig. 1. Portion of a frond; and Fig. 2. Fertile pinna, seen from beneath; *nat. size.* Fig. 3. Portion of a fertile pinna; *magnified.*

B. Pellæa densa, *Hook.*—p. 150.

Fertile plant; *nat. size.* Fig. 1. Fertile pinnule, seen from beneath; *magnified.* Fig. 2. Upper surface of a pinnule, showing the raphides (?), alluded to at p. 156; *magnified.* Fig. 3. Portion of the cuticle of the same; *very highly magnified.*

Fitch del et lith.

Pamplin imp.

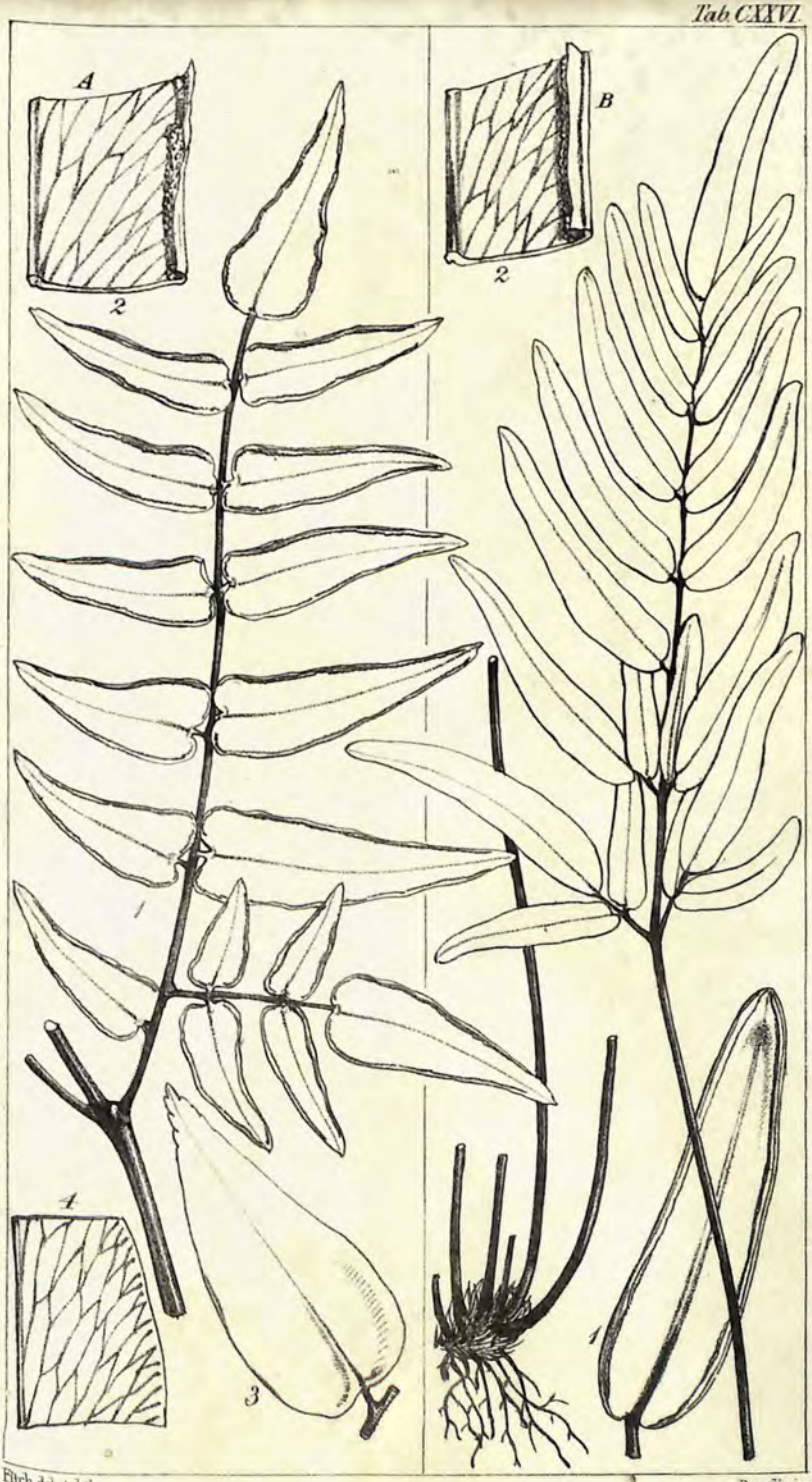
Tab. CXXVI.

A. Pteris (Litobrochia) articulata, *Klfs.*—p. 214.

Fig. 1. Portion of a fertile frond; *nat. size.* Fig. 2. Portion of a fertile pinna, seen from beneath; *magnified.* Fig. 3. Sterile pinna; *nat. size.* Fig. 4. Portion of the same, showing the venation; *magnified.*

B. Pteris (Litobrochia) Burkeana, *Hook.*—p. 213.

Fertile frond; *nat. size.* Fig. 1. Fertile pinnule, seen from beneath; and fertile portion of the same, showing the sorus and the venation; *magnified.*



Fitch del et lith.

Pamplin,imp.

Tab. CXXVII.

A. Pteris (Eupteris) crenata, *Sw.*—p. 163.

Fig. 1. Lower pinna of a fertile frond; *nat. size.* Fig. 2. Small portion of the same, seen from beneath; *magnified.* Fig. 3. Sterile frond; *nat. size.*

B. Pteris (Eupteris) heteromorpha, *L. fil.*—p. 166.

Fig. 1. Fertile portion of a frond, seen from beneath; *nat. size.* Fig. 2. Fertile portion of a segment, seen from beneath; *magnified.* Fig. 3. Sterile portion of a frond; *nat. size.*

Fitch, del et lith.

Pamplin, imp.

Tab. CXXVIII.

A. Pteris (Eupteris) gracilis, *Fée.*—p. 172.

Fig. 1. Sterile pinna; *nat. size.* Fig. 2. Fertile portion of a frond, seen from beneath; *nat. size.* Fig. 3. Sterile segment; *magnified.* Fig. 4. Fertile segment, seen from beneath; *magnified.*

B. Pteris (Eupteris) semidentata, *Fée.*—p. 172.

Fig. 1. Portion of a fertile frond, seen from beneath; *nat. size.* Fig. 2. Fertile segment, seen from above; *magnified.* Fig. 3. Fertile segment, seen from beneath; *magnified.*

Fitch del et lith

Pamplin imp.

Tab. CXXIX.

A. Pellæa Tamburii, *Hook.*—p. 134.

Fig. 1. Portion of a fertile frond; *nat. size.* Fig. 2. Apex of a fertile segment, seen from beneath, showing the depressions on the outer surface of the involucre, indicating the insertion of the sori; *magnified.* Fig. 3. Portion of a fertile segment, the involucre laid open, showing the venation and insertion of the capsules; *magnified.*

B. Pteris (Eupteris) pellucida, *Pr.* (simple-fronded form only).—p. 161.

Fig. 1. Sterile frond; *nat. size.* Fig. 2. Portion of a fertile frond of the same var., seen from beneath; *magnified.* Fig. 3. Fertile frond, seen from beneath; *nat. size.*

Fitch del. et lith.

Pamphilon imp.

Tab. CXXX.

A. Pteris (Eupteris) dactylina, *Hook.*—p. 160.

Fig. 1 and 2. Sterile and fertile fronds; *nat. size.* Fig. 3. Portion of a sterile pinna; *magnified.* Fig. 4. Portion of a fertile pinna, seen from beneath; *magnified.*

B. Pteris (Eupteris) umbrosa, *Br.*—p. 162.

Fig. 1 and 2. Lower primary pinna and apex of a sterile frond; *nat. size.* Fig. 3. Segment of a fertile frond, seen from beneath; *nat. size.* Fig. 4. Portion of a fertile segment, seen from beneath; *magnified.*

Fitch del et lith

Bompton imp

Tab. CXXXI.

A. Pteris (Eupteris) mutilata, *L.*—p. 164.
Sterile and fertile fronds; *nat. size.* Fig. 1. Sterile pinna, showing the venation and thickened margin; *magnified.* Fig. 2. Portion of a fertile pinna; *magnified.*

B. Pteris (Eupteris?) triphylla, *Ag.*—p. 171.
Fig. 1. Primary pinna, sterile; *nat. size.* Fig. 2. Portion of a pinnule of the same, to show the venation; *magnified.*

Fitch del et lith.

Bumpkin imp.

Tab. CXXXII.

A. Pteris (Eupteris) paleacea, *Roxb.*—p. 186.

Fig. 1. Portion of a stipes and fertile frond; *nat. size.* Fig. 2. Portion of a fertile segment; *magnified.* Fig. 3. Portion of the stipes, from part of which the scales have fallen; *nat. size.*

B. Pteris (Eupteris) laciniata, *Willd.*—p. 176.

Fig. 1 and 2. Portions of a sterile and of a fertile frond; *nat. size.* Fig. 3. Portion of a fertile pinna; *magnified.*

Fitch. del. et lith.

Pamplin imp.

Tab. CXXXIII.

A. Pteris (Eupteris) Jamesoni, *Hook.*—p. 193.
Fig. 1. Pinna of a frond; *nat. size.* Fig. 2. Rachis and sterile segment; *magnified.* Fig. 3. Rachis and fertile segment; *magnified.*

B. Pellæa gracilis, *Hook.*—p. 138.
Sterile and fertile frond; *nat. size.* Fig. 1. Sterile pinna; *magnified.* Fig. 2. Fertile pinnule; *magnified.* Fig. 3. Portion of a fertile pinna, with the involucre laid back to show the sori; *magnified.*

Fitch del et lith.

Pamplin imp.

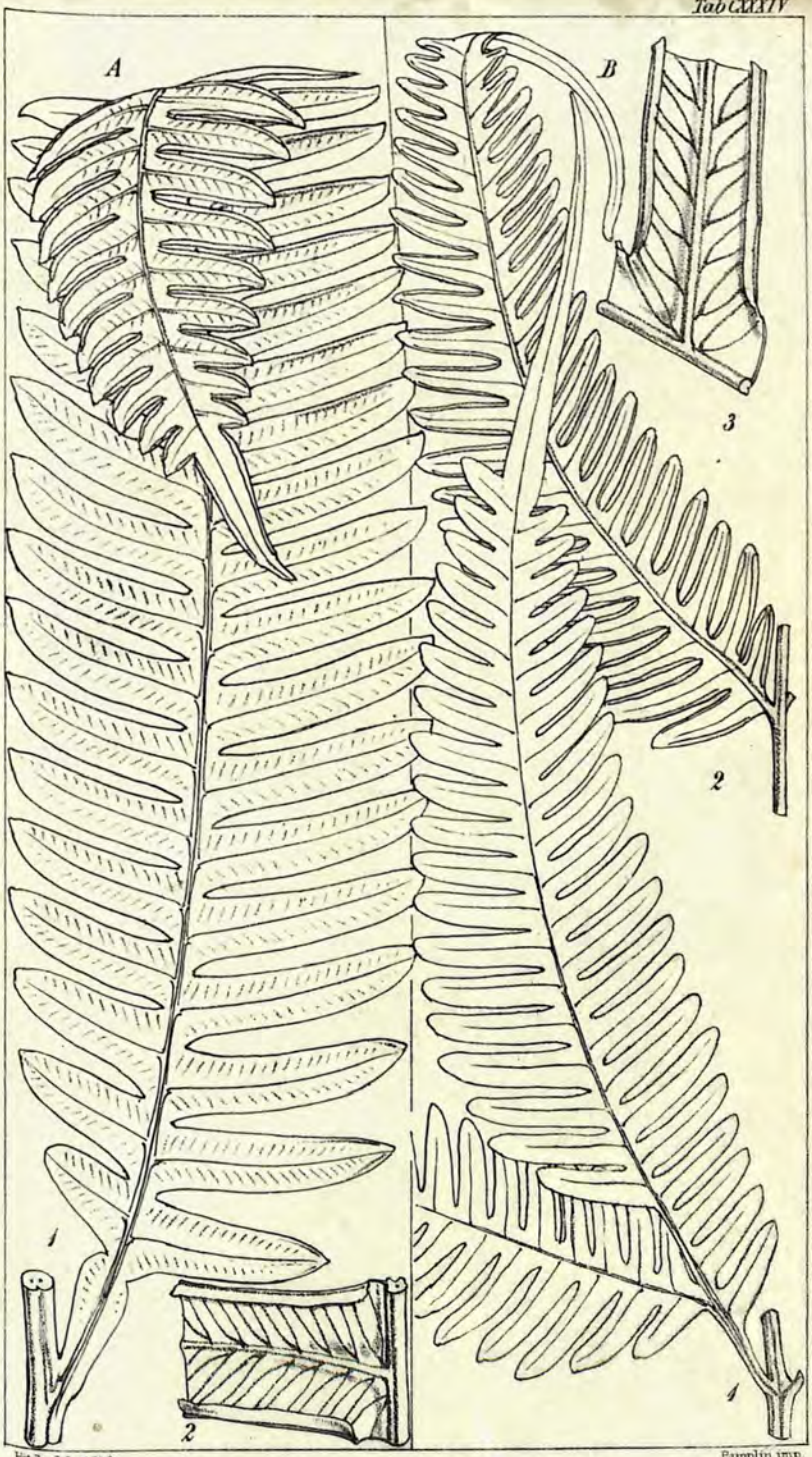
Tab. CXXXIV.

A. Pteris (Eupteris) longipinnula, *Wall.*—p. 179.

Fig. 1. Pinna of a fertile frond; *nat. size.* Fig. 2. Portion of a fertile segment; *magnified.*

B. Pteris (Eupteris) quadriaurita, *Retz.*—p. 179.

Fig. 1. Lowest pinna of a frond (sterile), showing its bipartite character; and Fig. 2. Intermediate pinna of a fertile frond; *nat. size.* Fig. 3. Portion of a fertile segment; *magnified.*



Fitch del et lith

Pamplin imp

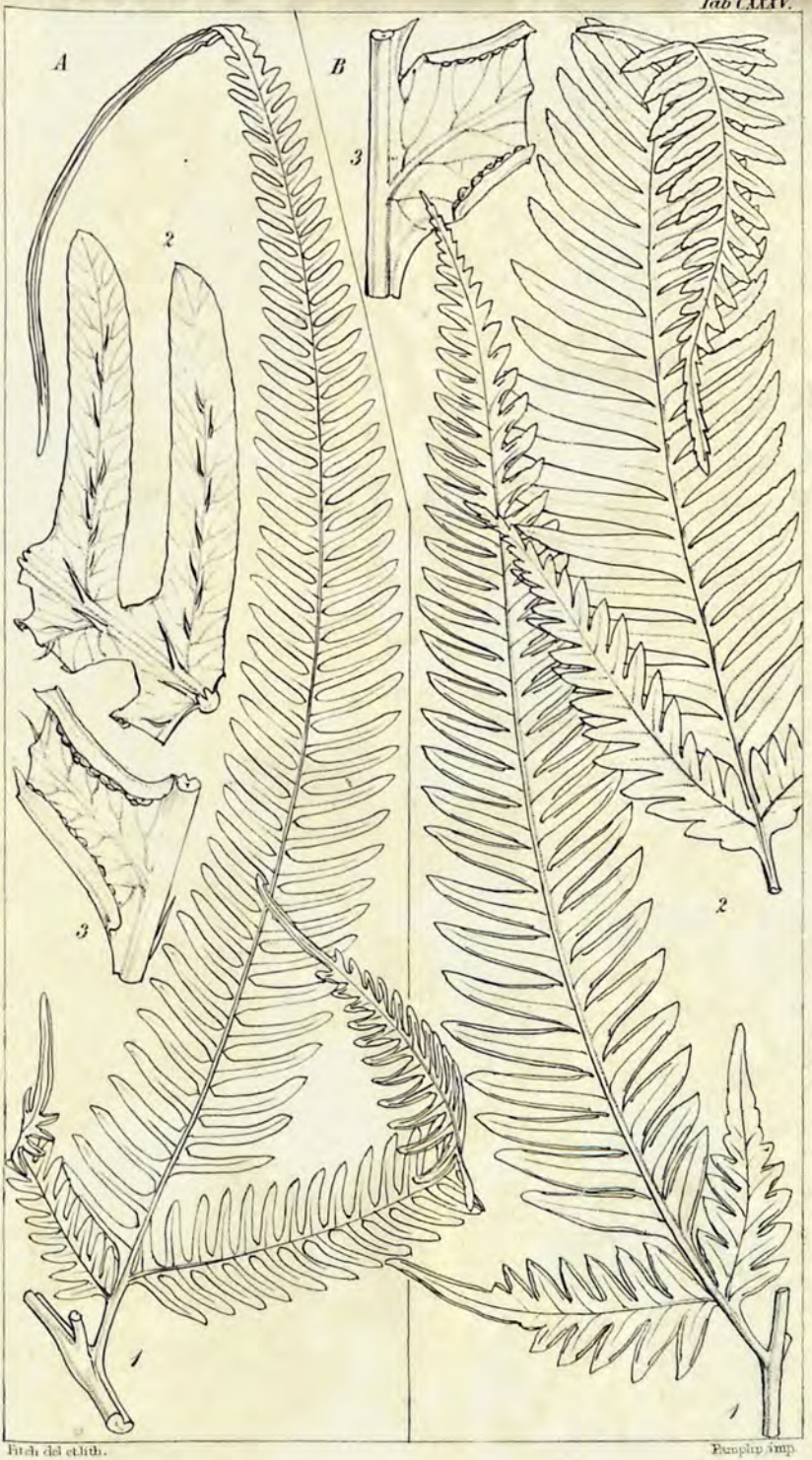
Tab. CXXXV.

A. Pteris (Eupteris) quadriaurita, *Retz.*—Var. *setigera.*—p. 181.

Fig. 1. Lower fertile pinna; *nat. size.* Fig. 2. Portion of a sterile pinna, showing the setiform spines; *magnified.* Fig. 3. Portion of a fertile segment; *magnified.*

B. Pteris (Eupteris) deltea, *Ag.*—p. 183.

Fig. 1. Fertile primary pinna; and Fig. 2. Sterile primary pinna; *nat. size.* Fig. 3. Portion of a fertile segment; *magnified.*



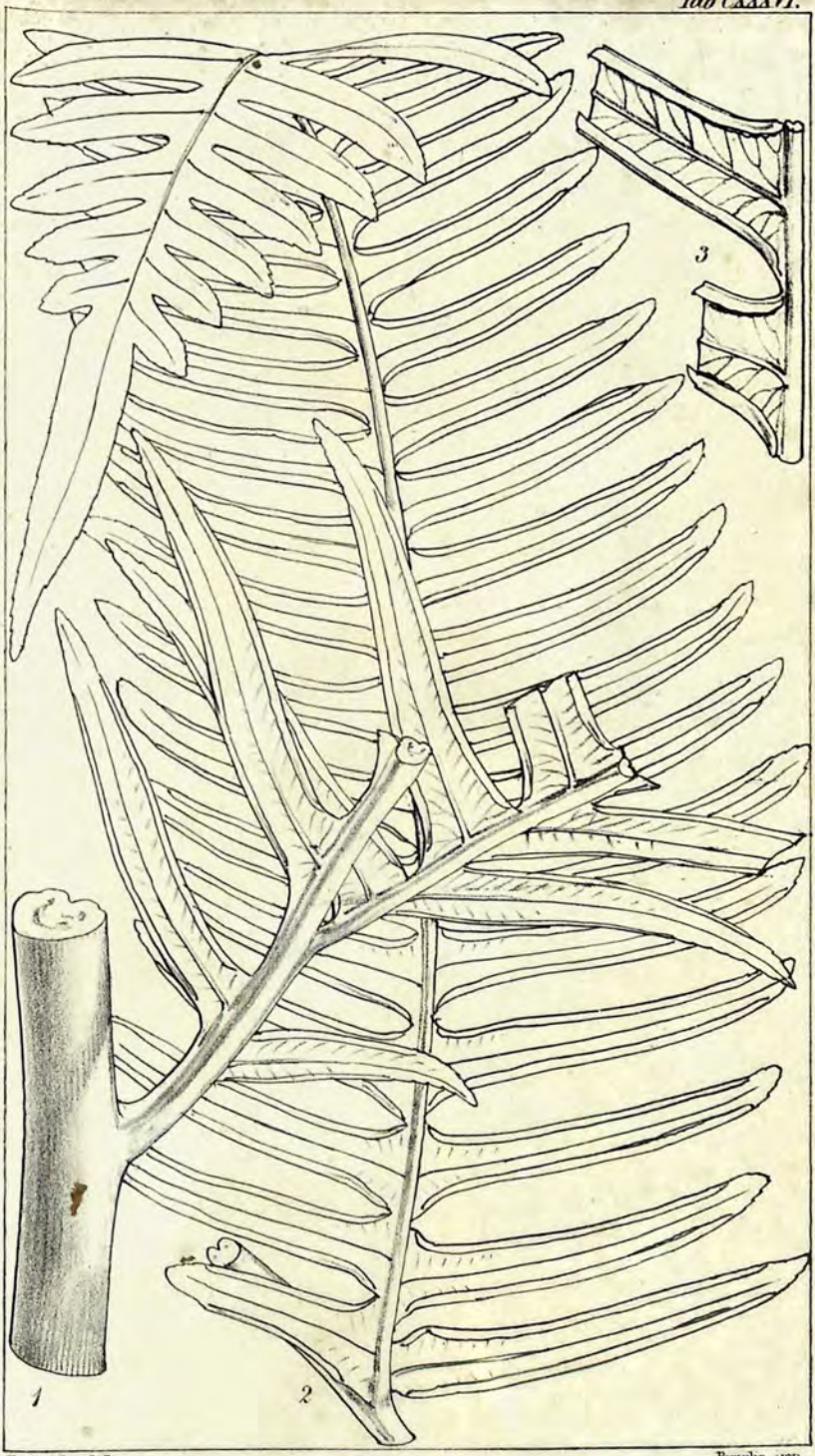
Fitch del et lith.

Pamplin Imp.

TAB. CXXXVI.

PTERIS (EUPTERIS) EXCELSA, *Gaud.*—p. 183.

Fig. 1 and 2. Portions of a fertile frond; *nat. size.* Fig. 3. Portions of fertile segments; *magnified.*



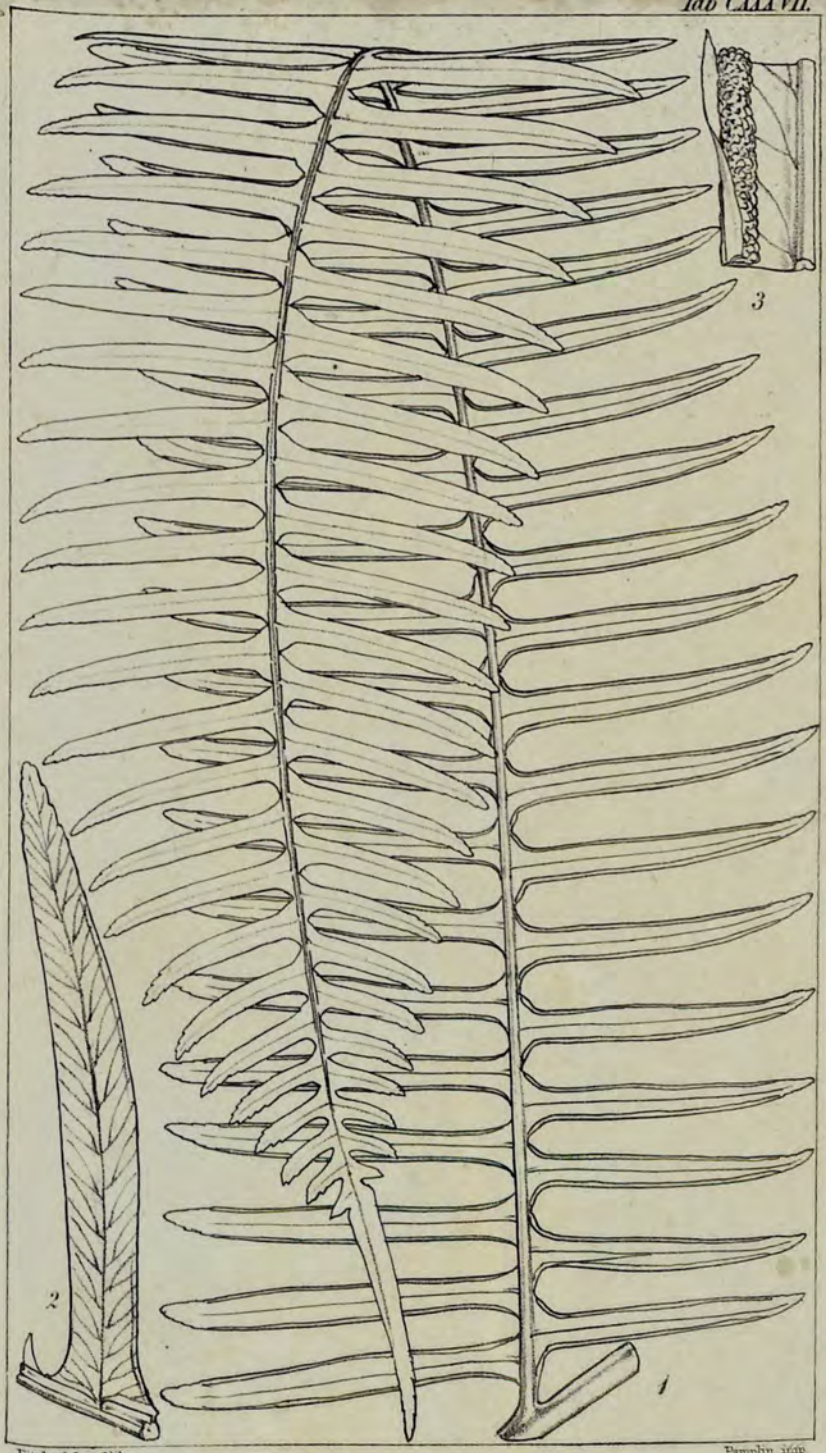
Eitch del et lith.

Pamphin. imp.

Tab. CXXXVII.

Pteris (Eupteris) patens, *Hook.*—p. 177.

Fig. 1. Fertile pinna; *nat. size.* Fig. 2. Sterile segment; *magnified.* Fig. 3. Portion of a fertile segment; *magnified.*



Fitch del et lith

Pamplin imp

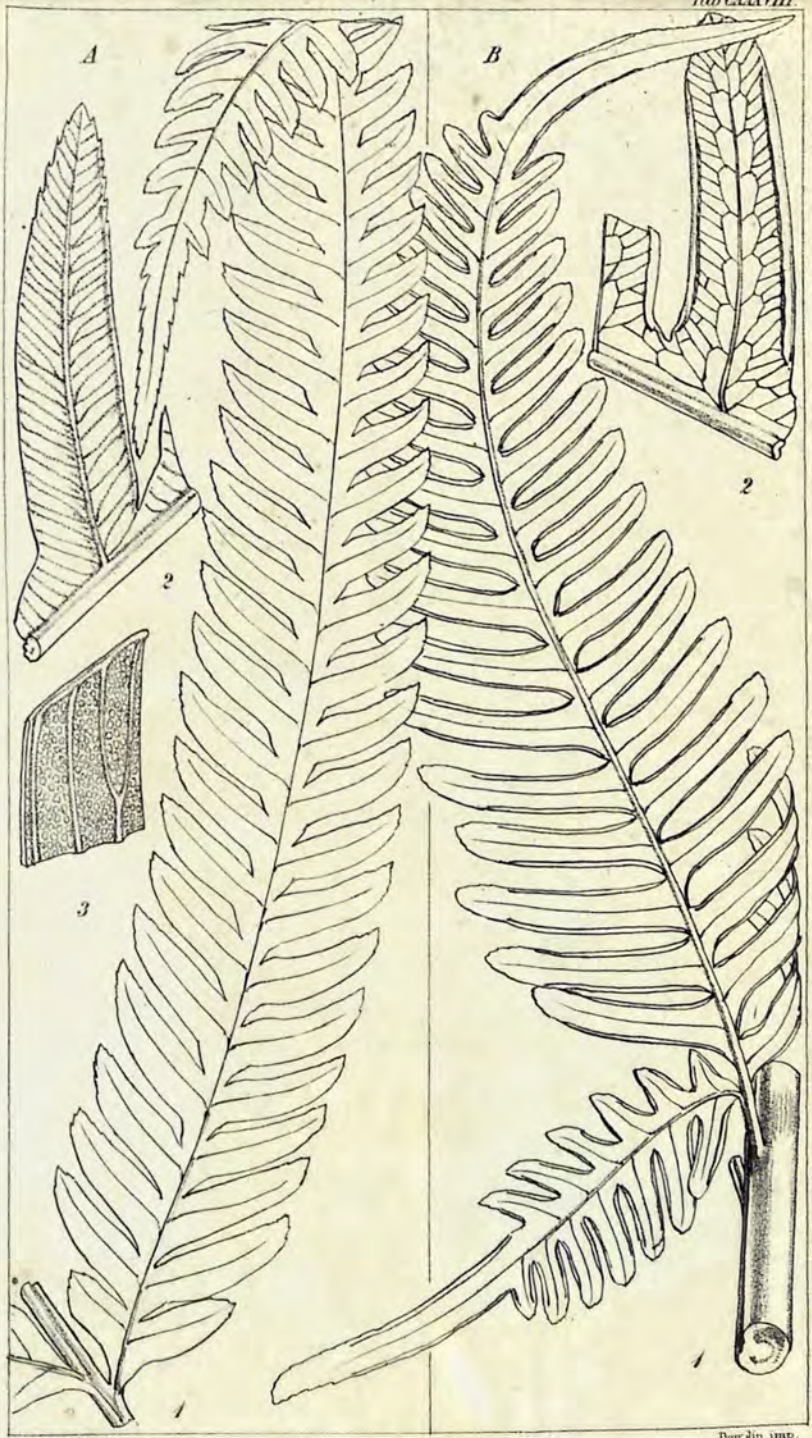
Tab. CXXXVIII.

A. Pteris (Eupteris) scabra, *Bory*.—p. 186.

Fig. 1. Sterile pinna; *nat. size.* Fig. 2. Sterile segment of a pinna; *magnified.* Fig. 3. Small portion of a segment, to show the dotted texture; *magnified.*

B. Pteris (Litobrochia) tripartita, *Sw.*—Var. γ, *Milneana.*—p. 226.

Fig. 1. Lower pinna of a fertile frond; *nat. size.* Fig. 2. Fertile segment of a pinna, showing the venation; *magnified.*



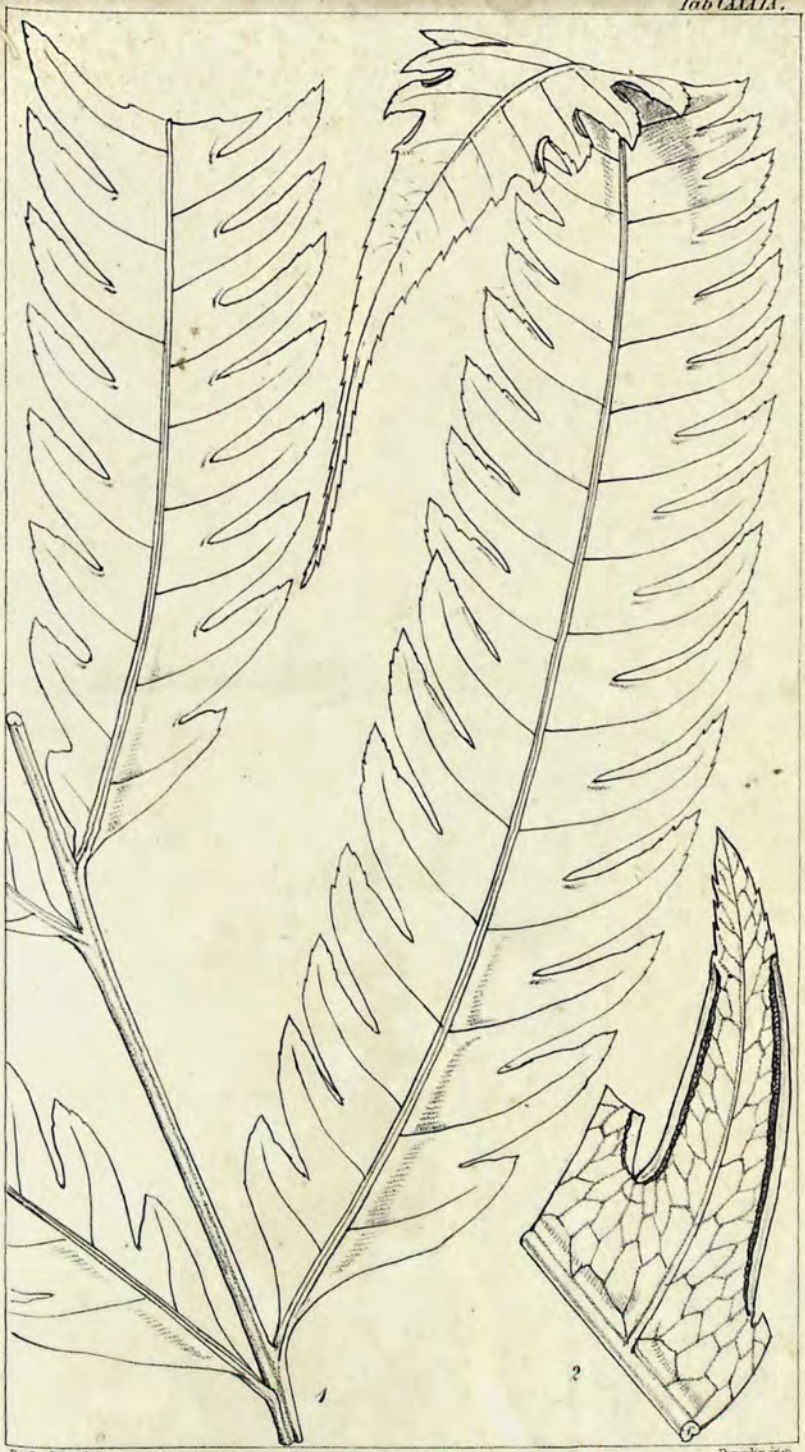
Fitch del et lith.

Dangelin imp.

Tab. CXXXIX.

Pteris (Litobrochia) Kunzeana, *Ag.*—p. 221.

Fig. 1. Portion of a fertile frond; *nat. size.* Fig. 2. Portion of a pinna, with sori, and showing the venation; *magnified.*



Fitch del et lith

Pamplin imp.

Tab. CXL.

Pteris (Litobrochia) Currori, *Hook.*—p. 233.

Fig. 1. Inferior, and Fig. 2, terminal, pinnæ of a fertile frond; *nat. size.* Fig. 3. Portion of a fertile frond, showing the venation; *magnified.* Fig. 4. Sorus and receptacle; *magnified.*

Fitch del et lith.

Pamplin imp

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